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SPINAL EPIDURAL GRANULOMA*

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A RECENT case with the symptoms and signs of spinal cord tumor, which was complicated by the presence of a lymphocytosis in the cerebrospinal fluid and fever, called to mind other cases of a similar nature seen in the past few years. At operation a firm, hard, localized mass of granulation tissue, some of it very fibrous and very adherent to the dura was found in the upper thoracic region. A review of the cases of spinal cord compression seen at the Massachusetts General Hospital disclosed three other cases of a similar nature since 1920, all non-syphilitic and non-tuberculous. In this paper only chronic localized epidural infections of metastatic or unknown origin will be considered; those due to direct extension from decubitus, osteomyelitis of the spine, and abscesses in the surrounding tissues will not be considered. Tuberculous infection of the epidural space will be discussed only in the differential diagnosis.

Pachymeningitis hypertrophica cervicalis, first described by Charcot[1] and Joffroy[2], has a characteristic clinical syndrome with syphilis as a basis. According to Dandy[7], Schultze[3] in 1903 and Mendel[4] in 1909 reported a case in which chronic inflammatory tissue was found in the epidural space; both were probably metastatic in origin and in both the staphylococcus was isolated. Orr and Rows[5] in 1914, published some very convincing experiments supported by case reports, from which they concluded that lymphogenous infection produces an inflammatory lesion of the spinal cord, while in the hematogenous variety inflammation is reduced to a minimum. In 1916 Elsberg[6] found an extradural tumor at operation, which he removed with a piece of the dura mater; on microscopic examination he found it to be a chronic inflammatory process. For about ten years very little was written about this condition, until Dandy[7], in an excellent article, reported three cases of extradural inflammatory tumors. Pachymeningitis hypertrophica with syphilis as a basis is occasionally found in the dorsal region, as shown by Joisten[8], and were it not for the Wassermann test or signs of lues in other parts of the body, the character of the lesion could be differentiated from the one described in this paper only on microscopic examination. Hassin[9] studied the histopathology very carefully and minutely in a case of circumscribed suppurative peripachymeningitis which followed furuncles over the body and isolated the staphylococcus aureus from the epidural mass; cultures from the furuncles had previously shown a predominance of staphylococcus aureus.

Earlier in this paper it was said that the cases to be described had the symptoms and signs of spinal cord tumor. The clinical syndrome of pain along the course of the spinal nerves, sphincter disturbances, and a sensory level with motor or sensory changes below the lesion was a constant one. Each of these was present in all of our cases and in all collected from the literature. Pain usually marked the onset of the disease; the pain in some instances had an insidious onset, was dull, aching, gnawing or burning; in others it was severe, stabbing and almost unbearable. Pain was followed by sphincter disturbances, usually within two months. After this, sensory or motor changes below the lesion soon made their appearance. One of our cases had a previous history of sepsis in the left hand and a perirectal infection; another had its onset during convalescence from typhoid fever, but little importance can be attached to this fact because cocci were found in the tissues. In the other two cases there was no history of infection in other parts of the body. Tenderness over the spine was present in half of our cases; all had exaggerated tendon reflexes in the legs, but only one had an ankle clonus and a positive Babinski sign. (Table I.) During the period of observation before operation, the temperatures of three of our patients reached 100.5°; the highest temperature charted for the other was 99°. After operation the temperatures of all reached 101°, some of them going higher. In spite of the sphincter disturbances, two of our cases had negative urine on admission to the hospital. The white blood counts ranged from 9,000 to 11,400. Neither the temperatures nor the leukocyte counts were probably due to urinary infection. Minor sepsis occurred in three of the operative incisions, due apparently to the chronic inflammatory process present; no note was made relative to the condition of the wound in the other.

We found that very valuable information could be gained from a complete examination of the cerebrospinal fluid, which in our cases included dynamic, cytological and chemical studies

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TABLE I

Spinal Epidural Granulomas

Reported by	Age and Sex	Primary Origin	Trauma	Level	Initial Symptom	Pain Location	Pain Character	Paraplegia	Duration of Paralysis	Bladder or Rectum	Sensation	Spine Tenderness	Elevation of Temp. on Admission	Leukocytes	Reflexes	Spinal Fluid	Duration of Life	Operation	Result	Preoperative Clinical Diagnosis
Schultze[2] 1903	24 M.	Chr. inflamm. tissue	—	V-VII dorsal	Pain	Lower ribs, back	Sudden, excruciating	Partial spastic	3 mos. 6 mos.	Disturbed function; no retention	Gradually rising sensory level	V-VI dorsal	—	—	Increased ankle clonus	—	10 mos.	+	Dead Necropsy	—
Mendel[4] 1909	—	Chr. inflamm. tissue	—	V-IX dorsal	Pain	Head, neck, back	Severe	Partial	2½ yrs. partial	—	Partial loss	—	—	—	—	—	3 yrs.	+	Dead Necropsy	—
Dandy[7] 1926	42 M.	Chr. inflamm. tissue	No	V-VIII dorsal	Pain	Back, sides	Severe, sharp	Partial	10 mos. partial	Incontinence	Sensory level	+	No	—	Greatly increased Babinski reflex +	53 cells xanthochromia	Well	+	Well	Inflamm. tumor
Dandy[7] 1926 (Ford's case)	Middle Age M.	Chr. inflamm. tissue	No	V-VIII dorsal	Pain	Back, waist	Sharp, severe	Partial	3 mos. partial	Incontinence	Sensory level	+	No	—	Greatly increased Babinski reflex +	9 lymphocytes	Well	+	Well	Tumor
Wiersma[19] 1928	22 M. Colored	Chr. inflamm. tissue	No	Dorsal	Numbness	Back, chest	Sharp	Complete	1 mo. complete	Retention	Sensory level	V-VI dorsal	—	—	Diminished No Babinski	1 cell xanthochromia	4 mos.	No	Dead Necropsy	—
Hassin[9] 1928	21 F.	Chr. inflamm. tissue	No	VIII-IX dorsal	Pain	Back, chest	Sharp, severe	Complete	5 dys. complete	Retention	Sensory level	—	—	—	Babinski reflex +	32 lymphocytes	2 wks.	No	Dead Necropsy	—
Watts and Mixter 1929 Case I	33 M.	Chr. inflamm. tissue	No	III-VII dorsal	Impotence	Abdomen, chest	Cramp-like	Complete	1 wk. complete	Incontinence	Sensory level	No	No	10,600	Increased	6 cells	8 mos.	+	Dead No necropsy	Tumor
Watts and Mixter 1929 Case II	59 M.	Chr. inflamm. tissue	No	IV-VI dorsal	Pain	Back	Vague	Partial	3½ mos. partial	Retention	Sensory level	IV-V dorsal	No	11,400	Increased No plantar response	10 lymphocytes	?	+	Improved	Tumor
Watts and Mixter 1929 Case III	47 M.	Chr. inflamm. tissue	No	Cerv. VII to dors. II	Pain	Chest, shoulder back of neck	Sharp, stabbing	Partial	3 mos. partial	Frequency	Sensory level	No	No	9,000	Increased. Babinski and clonus +	51 lymphocytes	?	+	Improved	Tumor
Watts and Mixter 1929 Case IV	45 F.	Chr. inflamm. tissue	No	Cerv. VII to dors. III	Pain	Back, chest	Dull, aching	Partial	2 yrs. partial	Urgency	Sensory level	II dorsal	100°	10,000	Increased No Babinski	58 lymphocytes	Well	+	Well	Tumor

on the fluid obtained from the lumbar region and the cisterna magna. In three of the four cases a partial or complete subarachnoid block was demonstrated both by dynamic and chemical tests, and by chemical tests alone in the fourth. An increase in lymphocytes was noted in the spinal fluid in all cases, the counts ranging from 6 to 58 per c.mm. The protein in the lumbar fluid was markedly increased in every case, as was to be expected. Curiously enough, the cistern fluid showed a definite increase in the protein content in three out of the four. This finding is not easy to explain, but it may be that the protein is more commonly increased above an inflammatory lesion than above a new growth. However, Cushing and Ayer[14] found xanthochromia and increased protein in the spinal fluid above tumors of the cauda equina; a less marked increase would be expected far above the site of compression due to dilution by new fluid from choroid plexus. The colloidal gold curve was abnormal in every instance, but, as will be seen on referring to the table, it was not characteristic. (Table II.)

Lipiodol was injected into the cisterna magna in three of the cases; in two definite evidence of a subarachnoid block could be seen on x-ray examination; in the third, globules of lipiodol were streaked down the spinal canal. (Figs. 4, 5, and 7.)

At operation in cases II and IV a firm, hard, localized mass of granulation tissue, with a definite upper and lower limit, was seen on removing the laminae of the vertebrae; it was very adherent to the dura and was removed with considerable difficulty, the underlying dura appearing practically normal. In case IV the growth extended around laterally and in front of the cord, being very thick on the left side; the inner surface of the tissue dissected off the dura was smooth and glistening and the outer was rough and irregular. In case I the epidural space was filled with a flattened tumor mass, intimately associated with the outside of the dura and extending around the cord laterally. The dura and tumor were excised on the posterior surface. In case III the dura was greatly thickened anteriorly and to the right of the cord. A piece of this thickened dura was removed. To summarize the gross pathology: in two cases the inflammatory tissue could be separated from the dura mater; in one it was so intimately associated with the dura that no line of cleavage could be found yet it had definitely the appearance of a tumor mass; in the other the dura itself seemed to be thickened.

Microscopically the picture was that of a chronic inflammatory process; the reaction was more marked toward the periphery than toward the center of the specimens. In a typical section, plasma cells predominated and many polymorphonuclear leukocytes and a smaller number of large mononuclear cells and lymphocytes

TABLE II

COMBINED CISTERNAL AND LUMBAR PUNCTURE

	Locus	Color	Jugular Compression	Cell Count	Total Protein mg. per 100 c.c.	Wassermann	Colloidal Gold Curve	Lipiodol Descending
CASE I	Cisternal			0 Cells	100	———	———	———
	Lumbar	Colorless	No block	6 Lymphocytes	250	Negative	1123210000	
CASE II	Cisternal			———	13	———	0000000000	Arrested at D' and D''
	Lumbar	Colorless	Partial block	10 Lymphocytes	143	Negative	1233354321	
CASE III	Cisternal			23 Lymphocytes	54	Negative	1112210000	Scattered C' to D''
	Lumbar	Colorless	Partial block	57 Lymphocytes	402	Negative	1111123100	
CASE IV	Cisternal			18 Lymphocytes	51	Negative	5555432100	Arrested at D'
	Lumbar	Yellow	Partial block	58 Lymphocytes	133	Negative	4455443321	

were seen. In case III, a few foreign body giant cells were seen in areas where there was degenerating collagen; there was a large preponderance of plasma cells, many lymphocytes, endothelial cells and fibroblasts, with some polymorphonuclear leukocytes. The microscopic pictures in Figs. 6 and 9 are very similar except for the arrangement of the collagenous fibers, although the former is a section from thickened dura mater and the latter from inflammatory tissue dissected off the dura. Fig. 10 shows a subacute inflammatory process with many polymorphonuclear leukocytes and plasma cells and several blood vessels.

CASE REPORTS

Case I.

The patient, P. P. (M. G. H. No. 235957), a married, white machinist thirty-three years old, entered the hospital April 1, 1920 complaining of

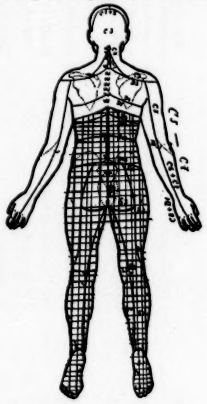

FIG. 1. Case I. Complete anaesthesia below seventh dorsal vertebra.

inability to walk and inability to void, of about four months' duration. His family history was not important. His past history was negative and he denied venereal disease.

His present illness began four months before admission to this hospital when he became aware of the onset of impotency. Two weeks later while lying down, both feet became numb simultaneously. This numbness in a few hours had reached the hips; he developed acute retention and called his physician who catheterized him. During the night he had "cramps" of the abdominal muscles and it felt as though something were "gripping his heart", making him gasp for breath. The sensory changes were followed in a few days by paralysis of the lower extremities; when the paralysis made its appearance, retention of urine was replaced by incontinence of urine and feces. His legs would often go into flexor spasms, though he could not move them voluntarily.

Physical examination showed pressure sores on the back and heels; those on the heels were healing; the one over the sacrum was 2 cm. in diameter and rather deep. The heart was enlarged and a systolic murmur was heard over the pulmonic area; the sounds were regular and of good quality. The lungs were normal. The abdominal muscles went into spasm on being palpated, but there was no tenderness. Pitting edema was present in both feet. The legs were drawn up into extreme flexion, were strongly adducted and could not be moved voluntarily. Complete anaesthesia was present below the 7th dorsal vertebra. (Fig 1.) The tendon reflexes in the legs were increased, more on the right than the left. A Babinski sign was present on right and left. The cremasteric reflex was absent bilaterally. On admission his temperature was 97.2°; pulse 62; respiration 18. Urine was normal; hemoglobin 85%; red blood count 4,672,000; white blood count 10,600; smear was normal. Wassermann reaction in the blood was negative. The urine was found to have a trace of albumin on the sixth and seventh examinations, with an occasional red and white blood cell per high power field, whereas it had been negative before. The kidney function by the phenolsulphonphthalein test was 20% in 2 hours and 10 minutes. A small amount of lead was found in the urine and stool. X-rays of the spine and sacrum were normal; the heart was generally enlarged, probably due to dilatation. A combined cistern and lumbar puncture was done; the pressure was essentially the same in both regions; there was no sign of a dynamic block, but there was evidence of a chemical one as the total protein in the lumbar fluid was 250 mg. per 100 c.c. and in the cisternal 100 mg. per 100 c.c.; 6 leukocytes per cu. mm. were counted in the lumbar fluid, none in the cisternal. The lumbar fluid was clear and colorless, the Wassermann test negative, and the colloidal gold curve 1123210000.

April 5, 4 days after admission, on the diagnosis of spinal cord tumor, a laminectomy was done from the third to the seventh thoracic vertebra. The epidural space was filled with a flattened tumor mass intimately associated with the outside of the dura. Dissection to the right opened the subarachnoid space. The dura and tumor were excised on the posterior surface; a small abscess was opened on the right side during the dissection. The tumor mass extended from the third to the seventh thoracic vertebra and could be seen surrounding the cord laterally on each side, probably meeting anteriorly. The dura was left open and the incision closed with drainage. A culture was taken from the tumor mass and staphylococcus aureus was grown. Microscopically, there was a chronic inflammatory process involving the dura; the predominating cells were plasma cells, polymorphonuclear leukocytes and large mononuclear cells, with a smaller number of small lymphocytes and fibroblasts.

The patient was discharged unimproved. There was no return of function in the legs; the incontinence was unrelieved. He died at home December 1, 1920 of septicemia, eight months after operation.

Case II.

The patient, J. L. (M. G. H. No. 267163), a white, married man, fifty-nine years old, a cabinet maker by trade, entered the hospital December 29, 1924 complaining of pain in the lower part of his back, of four months' duration. There were no familial diseases. He had four children living and well; one child died of croup; his wife had had no miscarriages. He had gonorrhea when a young man. One year ago he struck a splinter in the palm of his left hand and this became septic. He went to the outpatient department, where it was incised and drained; it was dressed for three weeks and became entirely well. Two weeks after sticking the splinter in his hand he began to have dysuria, frequency, difficulty in starting and stopping his stream; he noticed that the stream was very small. With this he had anorexia, weakness, chills and fever. He went to another hospital, where he had two operations on his scrotum and perineum, which relieved him completely; these operations were apparently performed to drain a perineal or prostatic abscess.

Four months before admission, which was eight months after sticking the splinter in his hand, he began to have vague pains in the lumbar region of his spine and through his abdomen. These became severe and were described as "pulling like a toothache". The pain was worse in the epigastrium and was sometimes burning in character; it was worse at night, interfering with his sleep; it was increased by straining at stool and by coughing. He continued work until two weeks before entrance when he awoke in the morning with a feeling of numbness in both legs as though they were asleep; the legs felt very heavy but he had no pain. He used a cane on account of the feeling of numbness. Constipation became obstinate with the onset of the numbness in the legs, his bowels moving with difficulty even after saline cathartics.

On *examination* he was found to have pyorrhea

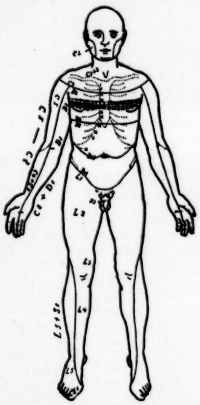

FIG. 2. Case II. Narrow zone of increased sensitivity at level of nipples. Though legs were numb subjectively, pain, touch and temperature were normal on examination.

alveolaris and caries of the teeth, many of which were missing. The left hand had healed perfectly; a small linear scar was seen just to the side of the rectum, but none was found on the scrotum. The cranial nerves were normal. The gait was spastic and ataxic; he tended to fall to the left; his unsteadiness, however, was no worse with his eyes closed. The heel to knee test was performed accurately. Motor power was good and all movements were possible. He used a cane in walking on account of the numb feeling in his legs; there was no atrophy of the legs; he swayed in the Romberg position but did not fall. The arms were normal. Though the legs felt numb, sensation to pinprick, cotton wool, heat and cold was normal. A zone of hyperaesthesia was demonstrated at the level of the nipples. (Fig 2.) He complained of lancinating pain, starting at the twelfth dorsal vertebra, radiating around the body when he coughed. The reflexes in the arms were normal; the knee jerks and ankle jerks were very lively; no plantar response was obtained; there was a reduplication of the ankle jerk but not a sustained ankle clonus; the abdominal reflexes were absent; the left cremasteric reflex was sluggishly present, the right absent. A residual of 120 c.c. of urine was found on catheterization. On admission his temperature was 98.7°; pulse 80, respiration 20; B. P. 170/90; the urine had the slightest possible trace of albumin and a few leukocytes. The hemoglobin was 80%; white blood count 11,400; red blood count 4,416,000; smear showed an increase of polynuclear cells to 78%. A lumbar puncture was done and the initial pressure was 110 mm. of water; on jugular compression it rose to 460 mm., but did not fall; the cell count on the fluid was 10 white cells; total protein 143 mg. per 100 cc.; colloidal gold reaction 1233354321; Wassermann reaction negative. Lipiodol was injected into the cisterna magna and x-ray examination of the spine showed the shadow of the lipiodol overlying the fourth and upper border of the fifth dorsal vertebrae, the lower border of the shadow being somewhat irregular and pointed. (Being of the inflammable type, these plates were destroyed.)

A laminectomy was performed from the second to the sixth dorsal inclusive. An extra-dural tumor was found which had eroded the laminae of the sixth dorsal vertebra; the upper edge of the tumor coincided with the level demonstrated by x-ray. The tumor was dissected off with some difficulty; it had a porky, translucent appearance; the underlying dura had a fairly normal appearance. The dura was opened as the cord seemed thicker and firmer than normal at this point; some thickening of the arachnoid and flattening of the cord were seen, but no other abnormalities. At this time the report came back that the tissue was of inflammatory nature. The dura was closed tightly with silk, and a rubber drain inserted down to the dura. On microscopic examination a chronic non-tuberculous inflammatory process composed of tissue rich in collagen and containing focal collections of wandering cells was found. Some of the focal areas contained small abscesses in their centers. A culture taken from the incision at the time of operation showed no growth. Following operation the patient had to be catheterized every eight hours for a week, then began to void normally. He had occasional incontinence of urine and feces. Two sinuses formed at the site of the incision and were treated by irrigation with Dakin's solution. Three months after discharge he had perfect control of his bladder; his walking was improving. He has been seen from time to time since. He has some loss of power in the legs with increase in the tendon reflexes but goes about freely. He has not resumed his occupation as he has enough money to live on. Sphincteric control is good and there are no abnormalities of sensation.

CASE III.

This patient, M. M. (M. G. H. No. 287826), a white, married cobbler forty-seven years old, entered the hospital complaining of sharp pains across his chest and numbness over the ulnar aspects of both forearms. His family history was negative; he had thirteen brothers and sisters all living and well; there had been no miscarriages or still births. Before the present illness he had never been sick and had never been in a hospital. He denied venereal disease.

His present illness began four months before admission to the hospital when he was awakened one morning with a sharp pain on the right side of his chest. He went to work but was forced to return home at once. During the day the pain radiated forward to the precordium; later it was very severe in both axillae and in the back of the neck. These pains were associated with a high fever and drenching sweats. The pain was so severe that he paced the floor most of the night. The following day the fever had gone down; he felt much better but still had the pain. For the next few days he suffered with anorexia and vomited everything he ate. He developed frequency of micturition, passing water about twelve times during the day and even more often at night. Pain was continuous and severe. Three months ago, he became aware of a feeling of numbness over the ulnar aspects of both hands and arms. This was more noticeable when he was cold. He believed he was unable to distinguish heat and cold over this area. He had five "fainting spells" in

the previous four months. Each was preceded by profuse sweating, then a cry followed by unconsciousness for five or six minutes. On waking he would be drenched with sweat and feel very tired and often he would go to sleep for a short time afterwards.

Examination: In the right side of the nose, in the middle meatus, some pus was seen. The teeth were dirty, ill cared for, and carious; there was mild pyorrhea. The tongue deviated markedly to the right and the right side was indented as if there were a slight amount of atrophy. He denied all lesions of the tongue which, in healing, might produce such a deformity. The other cranial nerves were normal. The patient was generally weak; the left hand was weaker and more awkward than the right. The tendon reflexes of the arms were diminished and those of the legs increased; dorsiflexion of the great toe was obtained bilaterally on stimulation of the sole of the foot; a sustained ankle clonus was present on the left and an unsustained one on the right. Sensibility was diminished to pin-prick, cotton wool and vibration over the ulnar sides of both forearms and hands. (Fig. 3.) There was no

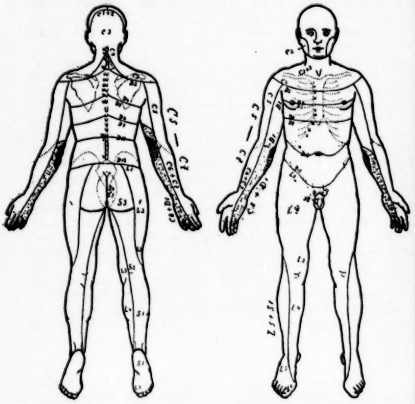

FIG. 3. Case III. Pain and touch absent over area with solid lines and diminished as indicated by broken lines. Vibratory sense absent over little and ring fingers.

loss of the sense of position or sense of heat and cold. On admission his temperature was 99°; pulse 80; respirations 19; B. P. 120/80; the urine was negative; hemoglobin 75%; white blood count 9,000; red blood count 5,430,000; smear was normal. X-rays of the heart disclosed that the supracardiac shadow was somewhat increased in size. The blood Wassermann test was negative. When a lumbar puncture was done, the initial pressure was 150 mm.; no pulse or respiratory oscillations were present; both the rise and fall on jugular compression were very slow, which suggested subarachnoid block.

A combined cisternal and lumbar puncture was done; the fluid was clear and colorless in both cistern and lumbar; the initial pressure was essentially the same in both; the pulse and respiratory oscillations were less in the lumbar manometer than in the cistern; on jugular compression the rise in the lumbar was slow and not so high as in the cistern; cell count in the cistern, 23 small lymphocytes, lumbar, 57 small lymphocytes; total protein in the cistern was 54 mg. per 100 cc. and in the lumbar 402 mg. per 100 cc.; the colloidal gold curve was 111221-0000 in the cistern and 1111123100 in the lumbar. The Wassermann reaction was negative on both cisternal and lumbar fluids. Lipiodol was injected into the cistern and on x-ray examination it was definitely arrested at the seventh cervical vertebra; in a short time globules were scattered from the seventh cervical to the tenth dorsal vertebra; there was no destruction of the vertebrae. (Figs. 4 and 5.)

FIG. 4. Case III. Lipiodol arrested at the seventh cervical vertebra.

FIG. 5. Case III. Later, showing the drug scattered in globules through the spinal canal; a partial subarachnoid block was found with the dynamic method.

A laminectomy was done from the seventh cervical to the second dorsal inclusive, the preoperative diagnosis being neurofibroma. The dura was found to be thickened, chiefly anteriorly and to the right, where it was 3 to 4 mm. in thickness. A portion of thickened dura was cut away and no attempt made at closure; the incision was closed without drainage. Histologically the tissues showed a chronic inflammatory process in the dura, more marked near the external surface, possibly indicating that it extended from without inward; a few foreign body giant cells were seen in areas where there was degenerating collagen. There was a large preponderance of plasma cells, many lymphocytes, endothelial cells and fibroblasts, with some polymorphonuclear leukocytes. (Fig. 6.) There was some leakage of cerebrospinal fluid from the upper end of the incision, with the formation of a small sinus, which had to be sutured to close it. Before leaving the hospital the patient complained of pains in the arms similar to those before operation. A lumbar puncture disclosed yellow fluid, with a dynamic and chemical block more marked than the previous one; 40 small lymphocytes were found per cu. mm.; the total protein was 1860 mg. per 100 cc.

CASE IV.

The patient, K. A. (M. G. H. No. 296149), a white married housewife, forty-five years old, entered the

hospital January 9, 1929 complaining of pain radiating from her spine out under her left shoulder. There was no history of familial disease. She has two children living and well. There were no other pregnancies. Her past history was negative except for recurring attacks of tonsillitis; seven years ago she had all of her teeth extracted.

Her present illness began two years before, during convalescence from typhoid fever. Shortly before leaving the hospital she became aware of a dull pain under her left scapula; it was constant, sometimes radiated around under her left breast, but was not severe enough to keep her awake at night; later it radiated in the opposite direction, toward the spine. She was seen in the outpatient department nine months after the onset and a diagnosis of intercostal neuralgia was made. For one year the patient had had urgency, frequency and nocturia and on a few occasions, incontinence of urine. About this time the pain sometimes radiated from the spine around to the sternum; it was worse on walking than at any other time; her sleep was disturbed as she was often awakened by it. One month before admission a feeling of numbness was noted over her legs and abdomen and occasionally the same sensation was present in her hands. This disturbance of sensation has not interfered materially with walking, though at times she could not tell where her legs were.

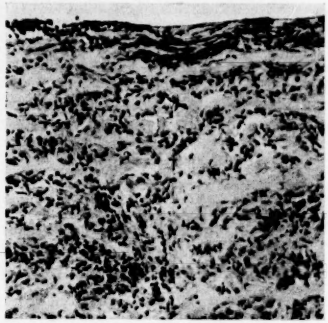

FIG. 6. Case III. Chronic inflammatory process in the dura mater; a preponderance of plasma cells and many lymphocytes. H. & E. × 275.

FIG. 7. Case IV. Lipiodol arrested at the first thoracic vertebra.

On *examination* the patient was a well developed, somewhat obese woman of middle age; tenderness was elicited on pressure over the fifth to eighth dorsal vertebrae. The cranial nerves were normal. Strength was good in all extremities; there was no atrophy, paralysis or tremor. Sensation to pinprick was diminished below an indefinite level at about the second costal cartilage; the joint and muscle sense was intact on both arms and legs; the finger to nose and heel to knee tests were very accurately done; there was no dissociation of sensation. Her gait was a little unsteady but not characteristic. The tendon reflexes in the arms were normal; the knee jerks were very lively; the ankle jerks normal; there was no plantar response. The abdominal reflexes were not obtained, but this might have been due to the large, relaxed abdomen. On admission the temperature was 99.5°; pulse 80; respirations 20; B. P. 160/100; white blood count 10,000; hemoglobin 90%.

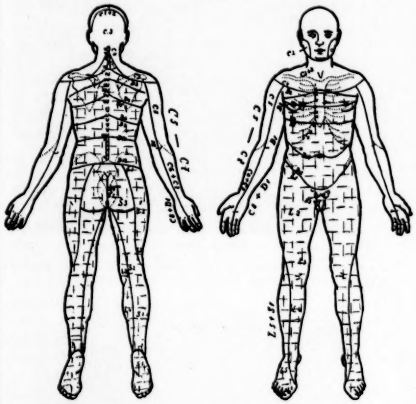

FIG. 8. Case IV. Pain and touch diminished as shown; sensory level on the back was not found until lipiodol was put in the cistern, after which it was very definite.

Lumbar puncture disclosed a dynamic and a chemical block in the subarachnoid space; the initial manometric reading was 230 mm. of water; the fluid was clear but xanthochromic; there was no rise on jugular compression; 58 small lymphocytes per cu. mm. were found; the Wassermann test was negative; the total protein 133 mg. per 100 cc.; the colloidal gold curve 4455443321. As the level of the lesion was so indefinite, a combined cisternal and lumbar puncture was performed. The pressures in both locations were essentially the same; a good rise of fluid occurred on jugular compression in the manometer attached to the needle in the cistern but none in the lumbar manometer. In the cisternal fluid 18 lymphocytes per cu. mm. were found; the total protein was 51 mg. per 100 cc.; the colloidal gold curve was 5555432100 and the Wassermann test negative. Lipiodol was injected into the cistern and under the fluoroscope it was seen to be arrested at the level of the first thoracic vertebra, with a fairly definite cap. (Fig. 7.) X-rays taken two days later showed considerable lipiodol remaining at the level of the first thoracic vertebra, though some had passed into the cul de sac. Following the introduction of lipiodol into the cistern, the patient complained for the first time of a severe pain radiating from the lower border of the right scapula forward; she also had pains down the backs of her legs. On palpation of the spine tenderness was elicited over the second dorsal; a definite sensory level was found at the

second dorsal vertebra, below which sensation to pin-prick was diminished. (Fig 8.)

Laminectomy was performed from the seventh cervical to the third dorsal vertebra inclusive, with a preoperative diagnosis of spinal cord tumor. A hard mass of bluish granulation tissue was found, some of it very fibrous and firmly adherent to the dura. It extended from the seventh cervical to the third thoracic vertebra and was dissected off the dura with considerable difficulty. The mass ex-

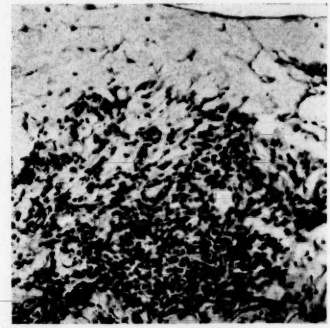

FIG. 9. Case IV. Chronic inflammatory tissue also showing the smooth surface where it was dissected off the dura mater; dense collagenous fibers, with a predominance of plasma cells and some lymphocytes. H. & E. × 275.

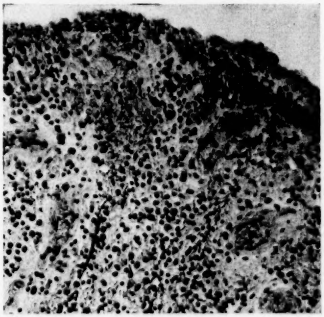

FIG. 10. Case IV. Rough, irregular, outer surface of the inflammatory tissue where the process is subacute; the granulation tissue has an abundance of polymorphonuclear leukocytes and plasma cells and several blood vessels.

tended around in front of the cord and was thicker on the left side; a piece of this inflammatory tissue 5 cm. long and .5 cm. wide was excised. It was not possible to remove all of the mass from in front of the cord. The dura was not opened; a drain was inserted at the site of the tumor and the incision closed. The outer surface of the tissue removed was rough and irregular, the inner smooth and somewhat glistening; on sectioning, the inner 1-2 mm. was white in color while the remaining outer part was brownish red. Microscopically the picture was that of an inflammatory reaction with plasma cells predominating; there were many eosinophile and neutrophile polymorphonuclear leukocytes and a small number of large mononuclear cells, and lymphocytes. Endothelial cells were comparatively few. (Figs. 9 and 10.) In some areas there were fibroblasts. No giant cells were seen. In a Gram-Weigert preparation Gram-positive cocci arranged in small clumps and occasionally in pairs, were found; these were always in large mononuclear cells. The fragments of bone included in the specimen appeared to be normal.

Convalescence was uneventful except that three weeks after operation the patient complained of pain about the left scapula, particularly on carrying that arm far to the rear. This gradually became less severe, having almost disappeared at the time of discharge. Two sinuses formed, one at the site of the rubber drain put in at operation; both healed by granulation after discharging for six weeks. A lumbar puncture done a month after operation showed there was no block in the subarachnoid space; the fluid was clear and colorless; there was good rise and fall on jugular compression; four lymphocytes per cu. mm.; total protein 98 mg. per 100 cc.; culture negative; colloidal gold curve, 3444332210. Examination just before leaving the hospital disclosed good function in all extremities, with normal sensation over the entire body; the tendon reflexes in arms and legs were normally active; the sphincters were normal. No tenderness could be elicited on pressure over the spine. Her gait was slightly unsteady, but she had been out of bed only a few days.

The patient was seen June 5, 1929; since leaving the hospital she had had no pain, had slept well, her appetite had improved, and she had gained weight. She complained of a dragging sensation about her shoulders and a heaviness of her legs on walking up steps. Her strength was good in all extremities, but sensation to pin-prick was diminished below the xiphoid of the sternum. The biceps jerk was present; but the triceps was not obtained; the knee jerks and ankle jerks were normal; no plantar response was obtained. She walked without difficulty but tired easily. No tenderness was elicited on palpation of the spine.

DISCUSSION

Etiology. Study of the history of the four cases here reported fails to reveal a definite previous infection in three out of the four cases. In only one (case II) was such a history obtained. The history of typhoid fever in case IV cannot be regarded as important as the epidural infection was due to a gram positive coccus. Examination of the literature of this subject gives one the impression that there is a considerable difference of opinion among the various authors as to the mode of infection and that in many instances as in our own cases, no definite pathway can be established.

Apparently infection of the epidural tissues and the dura mater may occur in three ways: (1) as a primary infection; (2) by direct extension of pus from contiguous structures; (3) from a hematogenous or lymphogenous metastasis of an infection in remote parts of the body. Dandy[7] found in the literature cases of Lewitzky[10], Spencer[11], and Hinz[12], where necropsy revealed no other infection in the body and the abscesses were assumed to be primary in the epidural space. Wiersma[13] discovered nothing at necropsy which might account for the infection in his case. Dandy's[7] two cases were due to direct extension from deep mid-dorsal car-

buncles. Those of Schultze[3], Mendel[4] and Hassin[9] were metastatic.

We have no direct evidence as to the root of infection in these metastatic cases, but a very attractive theory is that of Orr and Rows[5]. In 1914 they drew attention to the differences between lymphogenous and hematogenous infection of the central nervous system. They were able to cause the first type by infecting the ascending lymph stream of nerves and the second by placing celloidin capsules containing a culture of bacteria in the abdominal cavity. They found that infection of the lymph stream of peripheral nerves is followed by an ascending perineuritis, which spreads to the posterior root ganglion along the spinal nerves to the cord. The loose areolar tissue overlying the perineurium, the ganglion, and the dura mater shows the greatest degree of inflammation. In both the peripheral nerves and the cerebrospinal axis, the degree of reaction diminishes from without inwards, and that portion of the latter directly connected by nerves with the peripheral source of infection exhibits the highest degree of inflammation.

In our own case II the infection may have traveled along the nerve sheaths in this way but it is surprising to find the granuloma to be mid-dorsal instead of in the cervical or lower lumbar region.

The cord appeared normal in the three cases in which the dura was opened and in only one of these was the arachnoid thickened. In the sections through the epidural tissue and dura, the inflammatory process is more marked toward the periphery, less in that part adjacent to the arachnoid; this suggests that the process spread from without, inward. We believe that it may start in the epidural tissue and spread inward, involving the dura; or possibly that it may start in the outer part of the dura, spreading inward toward the arachnoid and outward into the epidural space. Cases II and IV would support the former theory as the granulomatous mass could be stripped from the dura; case III was a thickening of the dura itself with no epidural mass, which would seem to indicate origin in the dura; case I, in which the tumor mass was too adherent to be stripped off, might fall into either group.

Diagnosis. The presumptive diagnosis of spinal epidural granuloma can be made in a case with the symptoms and signs of spinal cord compression when there is an increase of lymphocytes in the cerebrospinal fluid, and when syphilis and tuberculosis can be excluded. In three of our four cases, a partial or complete subarachnoid block was demonstrated both by dynamic and chemical tests, and by chemical tests alone in the fourth. An increase in lymphocytes was noted in the spinal fluid in all cases, the counts ranging from 6 to 58 per cu. mm. The Wassermann test on the cerebrospinal fluid was negative. The colloidal gold curve is indicative of some pathological process, but is not characteristic. Dandy[7] found 9 and 53 lymphocytes in his cases, and Hassin[9] 32 lymphocytes in his. Lipiodol, injected into the cisterna magna, will usually be arrested at the top of the lesion, frequently showing a definite cap. Spinal cord tumor can be excluded by the presence of cells in the cerebrospinal fluid. Pachymeningitis hypertrophica with syphilis as a basis occurs most often in the cervical region; frequently a history of infection or signs of syphilis in other parts of the body can be found; the Wassermann reaction on the spinal fluid is positive. Primary tuberculosis of the spinal meninges must be very rare as we have been unable to find such a case in the records of the Massachusetts General Hospital. Of course it is impossible to rule out entirely the possibility of tuberculosis arising in the spinal column and extending into the epidural space for the lesion of the spine may be impossible to demonstrate by physical examination or x-ray. Chronic spinal adhesive arachnoiditis following cerebrospinal meningitis may produce a subarachnoid block and also a lymphocytosis in the spinal fluid; the history of preceding meningitis is sufficient to differentiate these conditions.

Treatment. The treatment depends upon the pathology. If a chronic inflammatory epidural mass is simply causing pressure on the spinal cord, as occurs in extradural tumors arising from the meninges or spinal nerves, it should be stripped from the dura, leaving the dura closed. There is definite danger in opening the dura because the inflammation may spread to the leptomeninges. On the other hand, if the inflammatory process in the dura itself causes a narrowing of the cerebrospinal space by scar tissue contraction, it may be necessary to incise the dura to relieve the cord compression. A drain should be inserted in all cases.

Prognosis: The group of cases here reported even if combined with those found in the literature is too small to enable us to give an accurate prognosis in any given case but we believe that it is fair to say that the prognosis is fairly good except in those cases which develop meningitis and in the small proportion in which the process is diffuse as in hypertrophic pachymeningitis.

CONCLUSIONS

1. The symptoms and signs of spinal epidural granuloma are sufficiently distinctive to give us a definite clinical syndrome. This syndrome is characterized by evidence of cord compression, pain, spinal subarachnoid block, fever and a definite lymphocytosis in the lumbar fluid and by the complete absence of evidence of syphilis or tuberculosis.

2. The treatment of this condition is operative.

3. If there is a line of cleavage between the inflammatory tissue and the dura, it should be stripped off without opening the dura. If the inflammatory process in the dura itself causes a narrowing of the cerebrospinal space by scar tissue contraction, it may be necessary to incise the dura to relieve the cord compression.

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FORGOTTEN FOREIGN BODIES*

BY LYMAN RICHARDS, M.D.†

THE removal of foreign bodies from the upper air and food passages, once one of the outstanding accomplishments in medicine, is now but rarely a cause for special comment except in certain newspapers with a penchant for the sensational. Improved instruments and excellent postgraduate instruction have led to the existence of a relatively large number of specialists in bronchoscopic work, who take such matters as the removal of a coin from the esophagus or a tack from the bronchus as part of the day's work, and tend less and less to regard these cases as worthy of recording in print, unless there is some outstanding feature of note. Moreover, the propaganda presented by these specialists has made the public gradually more and more foreign-body-minded, so that parents make more of an effort to avoid mishaps by restricting their children's playthings to objects not likely to be swallowed or inhaled. In spite of this, however, each year there occurs a not inconsiderable number of these accidents, for which the services of the bronchoscopist must be called in. There then arises the important question, how shall parents or patients get in touch with the specialist? It is unlikely that, in the average instance, they have any idea on whom to call but, as in the case of any other illness, will summon their family physician. Therefore, the first diagnosis, and the dispensation of the case subsequently, rests on one who is not a bronchoscopic specialist and whose dealings with foreign body cases and experience in interpreting their symptoms are necessarily somewhat limited. Because of this, it is obviously of the utmost importance that the family physician facilitate the establishment of the diagnosis of foreign body and put the patient in touch with some one skilled in its removal.

In view of their relative rarity, foreign bodies must, of necessity, occupy a somewhat inconspicuous place in the general practitioner's mind. So often are the symptoms arising from the aspiration of a nut, or the unsuspected swallowing of a toy, due to a far commoner cause, such as pneumonia or indigestion, that it is natural to put these more usual diagnoses to the fore. To forget foreign body as a possible diagnosis in any obscure case is not inexcusable. That it is so forgotten is the justification for this article.

When the family physician is called upon to diagnose such a foreign body case, he is faced with one of two situations. First, the parent or individual may state directly, or upon being questioned, that they suspect, or are positive, that aspiration (or swallowing) has occurred. A pin has been missed, the child has been seen to choke while eating peanuts, or in some other equally suspicious way, a warning has been given, and the foreign body question has been raised. Under such circumstances, the physician should be in a strategic position to make a correct diagnosis, and should leave no stone unturned in order to substantiate or rule out foreign body as the central factor, no matter what the subsequent symptoms may be. If, in any way, the possibility of foreign body has once been raised by any sort of suggestion gathered from the history, it cannot be safely laid aside till physical examination, x-ray, or bronchoscopic examination has ruled it out. Strange to say, as will appear in the cases submitted below, the most direct statements of parents and patients have at times been treated with far too little consideration. Occasionally they have been pooh-poohed as ridiculous, or simply frankly disregarded, apparently because the succeeding symptoms were not of sufficient violence to accord with the idea of foreign body. Patients have traveled from one examination to another, repeating their timid suspicions of foreign body, before a final x-ray suggested by an astute practitioner revealed the thorough justification

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for their fears. The lesson is this: it is wise to take such a foreign body history at its face value. The worst that can happen is the taking of a negative x-ray film, or a negative bronchoscopic examination, and they are of value if only to narrow the diagnosis by the exclusion of foreign body.

Less easy is the problem where foreign body must be considered as a possible diagnosis in investigating symptoms of unknown origin. Here no one may have any knowledge of aspiration. Children, in particular, may inhale or swallow something unbeknownst to parent or nurse, and the first symptom may be a cough or vomiting. The physician called in for such general symptoms, not having foreign body in mind, may, quite naturally, as will appear in the appended case reports, treat such a case for some little time as chronic lung suppuration, or a digestive disturbance, when an x-ray at any time would settle the diagnosis. Even if a foreign body history is directly denied, it will pay to exclude it as a possibility, bearing it in mind as something to be taken into consideration.

Let not these remarks be interpreted as casting the slightest reflection on the diagnostic skill of the general physician, than whom there is no better all around diagnostician. They are rather to be regarded as a caution, and a plea to include foreign body as a possible explanation for symptoms which either cannot be otherwise explained, or which do not abate after appropriate treatment. Such cases, in the absence of a clearcut history, are by no means easy to diagnose and yet the importance of an accurate and early diagnosis is obvious. The longer such cases are neglected, the more damage takes place within the patient's body and the more difficult the final removal becomes. A foreign body in the bronchus, seen within a few days of aspiration, is a far easier bronchoscopic problem than one in which a few months' sojourn has added foul purulent secretion and granulations as complications. Long, needless suffering can be avoided if these cases can be diagnosed at the earliest possible moment. This can be accomplished, first, if a history of foreign body can be elicited, or, if voluntary, is traced to its ultimate conclusion; and secondly, if it is suspected as a cause of otherwise unexplained symptoms.

The following cases have been culled from the Bronchoscopic Clinic at the Children's Hospital in Boston, within the last six years. They illustrate the possibilities of disregarding or forgetting foreign body as a potential diagnosis, and the consequences of such delay. In each instance, a brief summary is followed by pertinent comments tending to bring out where the error lay and how it might have been avoided.

CASE No. 1. (Fig. No. 1.)

Since birth this patient has had attacks of cyanosis, particularly of the hands and feet, lasting about one hour, especially after her morning bath. About three weeks ago, the patient's three-year-old sister was playing with her when the mother heard the patient cough. Inquiring as to the cause, she was told that the patient had "swallowed some money". Since the mother observed no evidence of a foreign body in

FIG. 1. Coin in the esophagus for three weeks, unsuspected till symptoms suggestive of enlarged thymus led to an x-ray.

the throat, she paid no further attention until a fever developed, four days later. The patient was then taken to a clinic, where nothing abnormal was found. The question, however, of a thymus gland as the cause of the cyanotic attacks was raised and the patient referred to another clinic for an x-ray, with the resultant discovery of the foreign body.

COMMENT

Brought to one clinic for periodic cyanosis and a questionable enlargement of the thymus this baby was said, in the absence of an x-ray, to show nothing abnormal on physical examination. A visit to a second clinic resulted in an x-ray, primarily to rule out thymus, but revealing the foreign body. Moreover, a history clearly indicating the possibility of foreign body was obtained. The presence of this coin in the esophagus, but undiagnosed for three weeks, illustrates the importance of endeavoring to elicit a foreign body history if possible, and of ruling one out, if not.

CASE No. 2. (Fig. No. 2.)

This patient had been sick for two months with indefinite symptoms. He had had some fever, a slight cough, and rather noisy respirations at night, and had been regurgitating almost all solid food. After various treatments had been tried without effect, he was finally referred for an x-ray of the chest.

COMMENT

This unusual foreign body was not missed by the family; hence the indefinite symptoms of uncertain etiology were allowed to remain undiagnosed until, at the end of two months, the suggestion that an x-ray be taken proved to be the solution of the problem. In such instances, without a leading history, it is only by keeping foreign body in mind as a possible explanation for

just such indefinite symptoms that an early and yet essential diagnosis can be made. One wonders in this instance why the symptoms were not more violent in view of the size of the trinket.

CASE No. 3. (Fig. No. 3.)

Eight days ago, this child, 1 year and eleven months old, fell out of a low chair to the floor, and was picked up gasping and crying hoarsely. It was soon able to breathe quite normally but could not talk. This condition has persisted to date with the addition of a cough for the past two days.

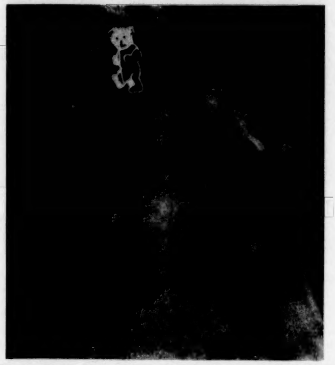

FIG. 2. Teddy bear pin in esophagus, two months' duration. Treated unsuccessfully for cough, fever and regurgitation of solid food till x-ray finally disclosed the correct diagnosis.

FIG. 3. Pin in the larynx. Hoarseness following a fall from a chair was unexplained and considered of no special import till, after one negative x-ray, a second revealed the unsuspected pin.

COMMENT

Here a common accident was followed by most uncommon symptoms; yet a week went by before the parents consulted a physician, who wisely suggested an x-ray. Strangely enough, this proved to be negative, but wisely again, laryngoscopy was considered advisable. A second x-ray clearly revealed the pin and removal was easily accomplished. Had the physician been satisfied, as one might easily and justifiably have been, with the evidence of the single negative x-ray, the foreign body might have remained indefinitely, and the hoarseness and aphonia been attributed to a chronic laryngitis. The pin was not missed and, of course, no history of its aspiration could be elicited from so small a child. It is in just such cases that the diagnosis is most difficult, and in which the consideration of a possible foreign body will, at times, lead to a brilliant result.

CASE No. 4. (Figs. No. 4 and 5.)

Five weeks ago, this child, aged 4 years and four months, was playing with a wild cucumber seed in her mouth. The parents "thought she swallowed the seed". She had a bad coughing spell twenty minutes later, apparently without pain. Later the same evening attacks of coughing were accompanied by choking. On the following day medical advice was sought and the parents advised to delay any special

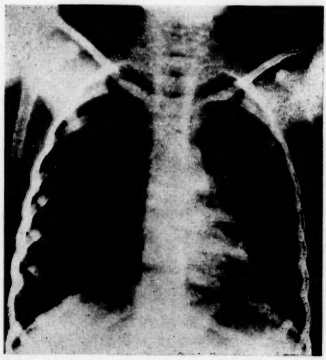

FIG. 4. Chest film showing the effects of a melon seed lodged in a bronchus for five weeks, allowed to remain in spite of knowledge of its aspiration.

FIG. 5. The foreign body removed from the chest shown in Fig. 4.

action for a few weeks until such time as the foreign body might show in an x-ray. Since then, coughing spells have persisted but without any other special indications of foreign body.

COMMENT

The history speaks for itself, without comment. Fortunately, this particular foreign body produced almost no symptoms and the evidences of any pathological effects observable at the time of bronchoscopic removal were almost nil. Notwithstanding, with such a straightforward history to base a diagnosis, or at least to warrant a suspicion, of foreign body, the delay advised in the present instance seems hardly the best policy in the average case.

CASE No. 5. (Fig. No. 6.)

This patient, 6 years of age, was said to have "swallowed a small pebble four weeks ago", having a choking spell at the time and getting a little blue. The parents shook the child, gave her bread to eat, and pushed their fingers down her throat, after which there was some apparent improvement. Since then the patient has had a slight wheezing, with some bronchitis and asthmatic attacks, which have been treated symptomatically. Two days ago, she was again examined and in spite of a previous negative x-ray film, referred for bronchoscopy because of the history of choking.

FIG. 6. A stone pebble loose in the trachea, allowed to remain for four weeks and patient treated for asthma in spite of a history of aspiration.

COMMENT

One of the most frequent causes of delay in foreign body diagnosis is the fact that the resulting symptoms may so easily be attributable to some other disease. Such a disease is asthma, and a freely movable, tracheal foreign body may so closely simulate it that, unless a history of aspiration is obtained or a routine x-ray taken, valuable time will escape before bronchoscopy reveals the true nature of the "asthma". In this instance a significant history was obtainable, for the asking, but for four weeks the diagnosis was asthma, until, in the face of one negative x-ray, a second showed the stone.

CASE No. 6. (Fig. No. 7.)

Six weeks ago, on Christmas day, this patient, aged 5 years, choked while eating some salted peanuts. A paroxysm of coughing lasted for an hour, and vomiting failed to relieve the feeling of a foreign body in his throat. The cough gradually lessened and for the remainder of the day he was more comfortable, but on the next day he was feverish and coughed more continuously. He was treated for a cold for a few days, and afterwards for bronchopneumonia. Still later, after attempts had been made to aspirate the chest, a diagnosis of pneumonitis secondary to a foreign body was made, and the patient referred for bronchoscopy.

COMMENT

The story of "choking on some peanuts" has a familiar ring. It is the layman's description of a definite symptom complex attendant upon the aspiration of an edible foreign body. This is supposed to go naturally down the esophagus, but a sudden cough, a slap on the back, or ill-timed laughter, opens the glottis at the wrong time and the damage is done. Immediately there follow some cyanosis, violent coughing, gagging and other evidences of nature's efforts to expel

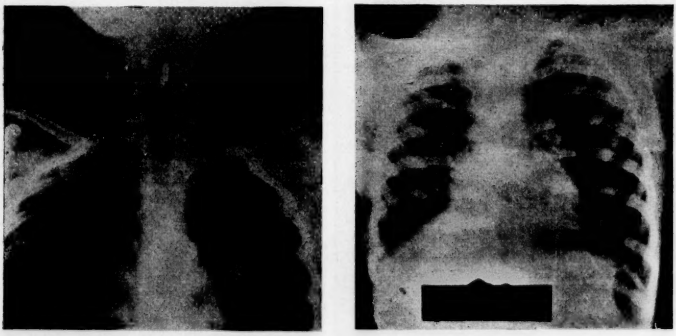

FIG. 7. To the left, a film showing the extensive pulmonary suppuration resulting from the eight weeks' sojourn of a peanut in the bronchus, treated as pneumonia in the face of a history of aspiration. To the right, a film a week after removal of the peanut.

the intruder. If these are successful, there will be no further symptoms; if not, there will gradually develop more and more signs that all is not well within the chest. Recurrent cough, intermittent fever, general malaise, will point to something wrong. With the passing of the initial violent symptoms, it is quite easy, on being called for the later milder ones, for the physician to disregard the history of aspiration and to conclude that the foreign body is no longer present. Nevertheless, it is precisely at this point that most mistakes are made, since once a nut, for example, has come to rest in a lower bronchus, it may cause surprisingly little disturbance objectively. Diminished breath sounds over one side, a little immobility of the diaphragm, occasional irritative cough, may be all that can be found on examination. Yet with this picture following such a history, bronchoscopy will many times reveal the foreign body, which, if allowed to remain, will sooner or later result in pulmonary suppuration. The case at hand illustrates all these points quite clearly.

CASE No. 7. (Fig. No. 8.)

Three months ago, this man coughed while eating some peanuts. Since then he has had constant cough, lately with expectoration of purulent sputum. This has so affected his appetite that he has lost forty pounds in weight, and has been unable to sleep at night with any comfort. Various treatments have proved ineffective, and examinations have not disclosed the cause of the cough. He finally was referred for bronchoscopic examination.

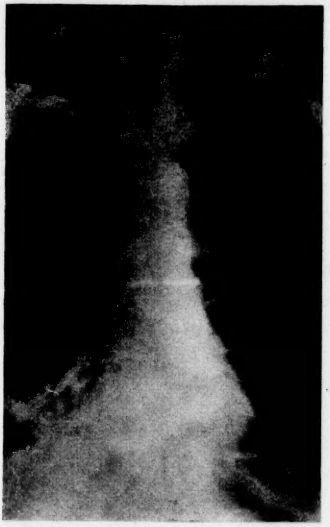

FIG. 8. Film of a chest, showing suppuration in the right lower lobe due to sojourn of a peanut in the bronchus of three months' duration. Diagnosis, suspected by the patient, was delayed until a 40-pound loss in weight was checked by bronchoscopic removal.

COMMENT

Rarely does an adult aspirate a non-opaque foreign body, but the occasion and its immediate effects should be sufficiently impressive to obviate the delay in diagnosis common in children. Nevertheless three months passed before a bronchoscopy restored this patient to health. In spite of his own knowledge of aspiration, he did not consult a physician for a month, but his story, offered for consideration on no less than three occasions, was only considered at length of sufficient import to suggest bronchoscopy. Prolonged suppuration by this time had resulted in great loss in weight, and a general appearance quite suggestive of malignant disease. Removal of the foreign body from the right lower bronchus, still intact after so long a time, was all that was needed to solve the problem.

CASE No. 8. (Figs. No. 9 and 10.)

Three months ago this 9-year-old patient "was supposed to have aspirated a piece of nut". She was held upside down by her mother and her back slapped with no results. In a few days high fever and delirium supervened, at which time a diagnosis of pneumonia was made, which was later changed to empyema. Fever continued intermittently with respirations up to 40. Two months before admission a portable x-ray was taken and a diagnosis made of adhesive pleuritis, central pneumonia, encapsulated fluid. Aspiration was negative and after another

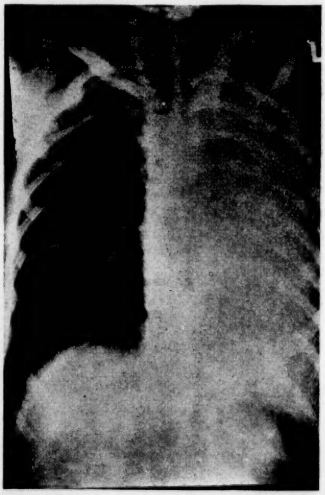

FIG. 9. Extensive pulmonary suppuration, with complicating empyema, resulting from the presence in the bronchus of a nut shell. In spite of a history of aspiration, the case was treated for pneumonia until bronchoscopy was finally advised.

month of fever and unexplained chest signs, the patient was examined bronchoscopically and the foreign body removed.

FIG. 10. The foreign body removed from the chest shown in Fig. 9.

COMMENT

A powerful illustration of the importance of investigating a parent's story before dismissing it as of no bearing on the case. After imparting her suspicions of foreign body aspiration on three occasions, this mother reluctantly admitted them on a fourth, so strong was her feeling that foreign body was not only an unlikely but a foolish suggestion. Yet it was weeks after the suspected aspiration and treatment for pneumonia before bronchoscopy revealed the nutshell and substantiated the mother's diagnosis. Suppuration had by this time gone so far that rupture had occurred into the pleural cavity, and intercostal drainage was necessary. The lesson of ruling foreign body in or out as a diagnosis in pulmonary suppuration, particularly in the face of a positive history, is all too plain.

CASE No. 9. (Fig. No. 11.)

Three hours before admission to the hospital, this three-year-old patient inhaled a hair clip. She was taken by her parents to the local physician, who immediately referred her for an x-ray. The diagnosis of foreign body in the bronchus being thus established, the patient was referred for bronchoscopy.

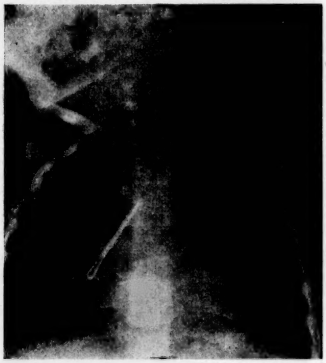

FIG. 11. A contrasting example of a case in which the patient, examined by a physician, an x-ray taken, and diagnosis made, was ready for bronchoscopy 3 hours after aspirating the bobber pin.

COMMENT

This case is included in this series as a striking contrast to the others. If every foreign body could be handled with similar expeditiousness, there would be fewer difficult or unsuccessful cases. Here, the parents were aware of the accident, and took immediate steps by consulting their physician. He, in turn, accepted their story as important, promptly corroborated it by x-ray and referred the patient for bronchoscopic aid, all within the space of three hours. Needless to say, the removal was a simple matter.

CASE No. 10. (Fig. No. 12.)

Eight weeks ago, this child, aged 1 year 1 month, began to wheeze, for the first four weeks without coughing, the last four with it. The spells were worse at night. On physical examination the baby had a slight cyanotic appearance and the lungs showed only a few scattered râles. The mother, on questioning, claimed that "child swallowed a safety pin about six weeks ago".

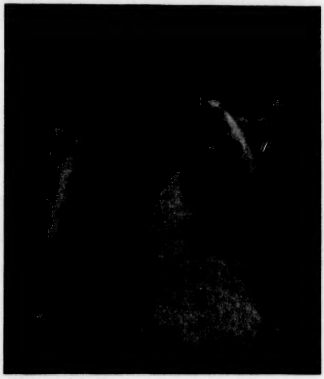

FIG. 12. Safety pin in the esophagus for six weeks, producing symptoms mistaken for some respiratory infection, until x-ray revealed the true diagnosis.

COMMENT

Lack of the mother's statement that a pin had been swallowed, or failure to inquire into the matter, would have made this case a most difficult one to diagnose. The symptoms were such as might be due to one of many conditions, among which only an x-ray could decide. And yet, either from the mother's failure to present her story sooner or to be queried, this pin remained in the esophagus, a potential source of serious trouble, for six weeks, during which a great variety of therapeutic measures must have been tried. Again one wonders at nature's tolerance for such an intruder at the age of one year.

CASE No. 11. (Figs. No. 13 and 14.)

Nine weeks before admission to the hospital, the patient, aged 7 years, had two abscessed teeth re-

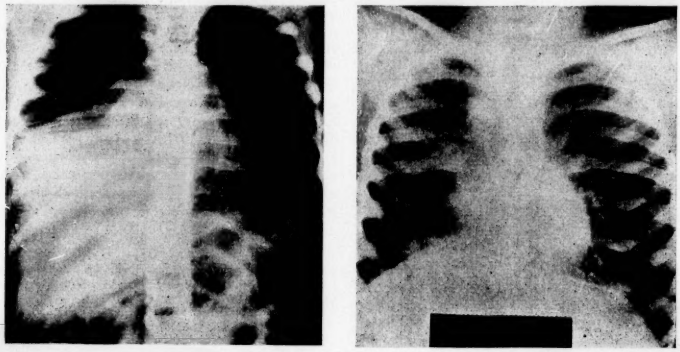

FIG. 13. Right lower lobe suppuration, existing for 3 months following the extraction of a tooth under gas anesthesia. Undue cyanosis at the time was soon followed by fever and cough, but treatment was instituted for pneumonia. Left, before removal. Right, after removal.

moved. There was, at the time, a great deal of cyanosis, supposedly due to an overdose of anesthesia. Two days later, a cough and fever developed and the patient was forced to go to bed, where she remained for one month. Five weeks before admission there

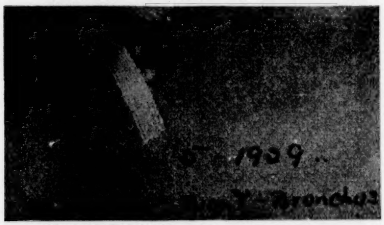

FIG. 14. The tooth, removed from the lung shown in Fig. 13.

was an improvement in the general condition, but ten days before entrance fever and cough increased and were accompanied by vomiting and a foul odor to the breath.

COMMENT

Whenever tooth extraction, particularly if complicated by undue cyanosis, is followed by cough and fever within the next few weeks, it is pretty likely that something has gone wrong. Not infrequently the tooth has gone down the bronchus. Whatever the cause, for the dentists' protection and the patient's health, x-ray examination should not be delayed. The effect of three months' such delay is shown in this instance where, before the diagnosis had been made, extensive lung infection had already taken place. Two bronchoscopic attempts were necessary before the tooth (Fig. 14) could be removed, and a desperate illness was followed by months of tedious convalescence. The merits of an earlier diagnosis, so clearly indicated by the history, are obvious.

CASE No. 12. (Fig. No. 15.)

This 10-year-old patient was well up to nine months ago, when she had a bronchitis, which caused her to lose weight and from which she did not seem to recover fully. Six months ago, she had pneumonia, which kept her in bed for two months. Recovery

FIG. 15. A tack in the bronchus, remaining an unknown time, while spreading pneumonia was the diagnosis. Finally, after months of decline, the patient reached a hospital, in time for an x-ray, but moribund and dying, too late for bronchoscopy.

was gradual, though a productive cough failed to clear up. A week ago, following exposure to rain, the cough increased, two teacupfuls of tenacious yellow brown material were raised, and there was coincident vomiting of almost all food. There had been a ten pound loss in weight and the patient's condition on admission was that of a desperately ill child.

COMMENT

No history of aspiration of this tack was available to throw light on the prolonged cough and raising of such large amounts of sputum. Yet, at any time between August and the following May, an x-ray film would have settled the matter and, in all probability, a bronchoscopy would have offered good hope of cure. Prolonged pulmonary symptoms which show no tendency to progressive diminution should always require the ex-

clusion of foreign body as a possible cause. In this instance, the child was moribund on admission, time availing only for an x-ray, bronchoscopy being out of the question.

CONCLUSIONS

The foreign body cases presented in this series have been collected from a larger group, to illustrate particularly the importance of giving due consideration to this condition when a diagnosis is being sought. Oftentimes the history of aspiration is available, but must be extracted from parents who may fail to consider their suspicions of sufficient moment to mention them. Unless the physician, having the possibility in mind, closely questions his informants, a valuable clue may be lost. In the absence of a history or in the face of its denial, he must still be unconvinced and unwilling to disregard foreign body until either x-ray or bronchoscopy, or both, have been exhausted. Many times his suspicions will prove unfounded and an unexplained cough will be due to chronic bronchitis or recurrent vomiting to dietary imbalance, but from time to time, with foreign body in his mind as a possibility, he will make a brilliant diagnosis, nay even save a life.

REFERRED PAIN OF GASTRO-INTESTINAL ORIGIN SIMULATING ANGINA PECTORIS*

BY ROBERT STERLING PALMER, M.D.†

INTRODUCTION

THE occurrence of sympathetic reflex phenomena in angina pectoris, causing vomiting, salivation, gaseous eructations, increased flow of urine[1, 2], and localized reflex hyperhidrosis[3, 4, 5, 6, 7], have been generally recognized. Especial attention has been paid to the abdominal symptoms accompanying coronary disease[8], symptoms which probably represent a reflex arc from heart or aorta to visceral end organs, namely, the pyloric or cardiac sphincters of the stomach. On the other hand, it appears that cardiospasm or pylorospasm of both functional and organic origin may give referred pain closely simulating angina pectoris. If the mechanism is not recognized, such referred pain may lead to an unduly grave prognosis. Furthermore, recognition of the possibility of referred pain of gastric origin simulating angina pectoris, even in those patients with some evidence of organic cardiac abnormality, may enable one to separate from patients suffering with the anginal syndrome, the less serious cases, especially the hypersensitive and apprehensive individuals, and may lead to more effective treatment.

The following cases illustrate this differential diagnosis and the favorable effect of a proper gastric régime.

COMMENT

The first patient whose record is summarized in the above table represents the large group of persons suffering from clear-cut severe coronary disease, whose symptoms include not only precordial pain or tightness with characteristic radiation on effort, but also epigastric gnawing and distress after meals or after fatigue. In this patient there was radiation of the discomfort into the arm, though this is not always present. Here one is probably dealing with a reflex arc, the first, or stimulating portion of which, arises from coronary or aortic disease and the end organ of which is the cardia or pylorus of the stomach. This particular patient received much relief from a low residue diet*, catharsis, and belladonna. A low-residue diet, or an ordinary diet divided into five or six small meals rather than three of the ordinary size, is not uncommonly employed in the routine treatment of angina pectoris.

*Low Residue Diet (Massachusetts General Hospital)

Breakfast
- Orange—Juice of one
- Cereals—Strained—Medium serving
- Egg—One—Soft cooked, scrambled or dropped
- Toast—White bread—Two medium slices
- Butter—One square
- Milk—One glass—6 ounces
- Cream—20%—2 ounces
- Sugar—3 teaspoons
- Coffee or Tea

Dinner
- Cream Soup—6 ounces
- Chicken, white meat, Fish or Scraped Beef—2 ounces
- Potato, baked—Medium size
- Bread, white—Two medium slices
- Butter—One square
- Dessert—Low residue—One serving
- Milk—One glass
- Sugar—2 teaspoons
- Tea

Supper
- Beef Broth
- Egg—One—Soft cooked, scrambled or dropped
- Macaroni, Rice, etc.—One serving
- Bread, white—Two medium slices
- Butter—1 square
- Fruit, strained—One serving
- Milk—1 glass
- Sugar—2 teaspoons
- Cocoa or Tea

Approximate Content	Carbohydrates	Protein	Fat	Calories
	300	80	95	2400

Patients II, III, and IV all complained of precordial, epigastric, or substernal aching, pressure, burning or pain, coming on paroxysmally after meals; in one, symptoms occurred especially on exertion after meals; in two the radiation to the shoulder and into the arms was typical of angina pectoris. Nitroglycerin, food, soda, and belladonna afforded relief. All patients were quite nervous; all three

*From the Massachusetts General Hospital Cardiac Laboratory.
Read before the Massachusetts General Hospital Medical Staff Meeting February 16, 1931.

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Case No.	Name	Sex	Age	Character	Duration (months)	Paroxysmal	Pain: Setting Cause	Radiation	Relief	Nerves or Vasomotor Symptoms: Vertigo	"Nerves"	Flushing, Blushing, Easy Fainting	Physical Manifestations: Heart	Abdomen	Heart	X-ray: G-I	Exp.	Treatment	Result	Remarks
I	Arth.	Male	51	Precordial apprehension, pain in precordium, radiated and after meals	4 years	+	Exertion after meals, Excitement	Both arms, more in left, neck	Nitroglycerin	+	++		Negative except aortic systolic	Negative	Slight +	Barium Meal, Colonic Bismuth, Fluid Cream	Coronary ? severe	Low residue diet, Belladonna	Relief	2 thrombi recovery thrombosis, Sudden death, ? coronary thrombosis
II	C.F.	Male	43	Precordial and epigastric substernal	8 years	+	After meals on retiring, Exertion	Shoulder arm	Nitroglycerin, Food, Soda, Belladonna	+	++		+	Negative	+	negative	Negative	Blood diet	Died 3 months later	Rheumatic heart disease
III	B.S.	Male	50	Low substernal pressure and precordial pain	24 years	+	Exertion, after meals	Arms	Nitroglycerin, Food, Soda, Belladonna	++++	++		Negative	Negative	? Slight +	Negative	Undersea left axis deviation	Blood diet, Belladonna	Some relief	Almost complete recovery in recent months
IV	A.S.	Male	44	Epigastric and Substernal pain	12 years	+	After meals on night, Excitement, Emotions	Precordium, Axilla, Shoulder, Back	Retching, Soda	++++	+++		+ (1st noted 15 yrs. ago)	Negative	+	Duodenal ulcer	Inverted Tg 0.5 Inverted Tg 24 hrs.	Blood diet	Slight, attack of pain relieved by a glass of milk	
V	Ash.	Female	32	Precordial and epigastric aching pain, Dyspnoea	6 years	±	After meals, Excitement	Arms	Rest, Relaxation		+++		Negative	Epigastric and infraumbilical tenderness	negative	Pylorospasm (persistent)	Negative	Blood diet, Belladonna	Both relieved	
VI	Mrs.	Female	35	Precordial pain	2 years	+	Exertion		Atropin. No relief from Nitroglycerin		++		Negative	Negative	Negative	Deformity pylorospasm (persistent)	Negative	Blood diet Belladonna	Almost complete relief	Para VIII 6 mos. pregnant.
VII	F.B.	Male	60	Low substernal pain, epigastric aching, Precordial oppression	3 months	+	Exertion after meals	Arms	Nitroglycerin		+++		Negative	Negative	Negative	Negative	Negative	Blood diet Belladonna	Almost complete relief	Recovered in running 8 mile attack pain.
VIII	Ash.	Male	57	Low substernal pressure	10 years	+	Exertion, Cold weather after meals	Both arms	Rest Nitroglycerin				Negative	Epigastric tenderness +	Negative	Duodenal ulcer	Negative except ? slight low inverted Tg all leads*	Blood diet Belladonna	Almost complete relief	Cross eyelids both eyes

had symptoms of unstable vasomotor systems; in two there was marked physical exhaustion.

Patients III and IV were suffering, in common terms, from a so-called nervous breakdown. Physical examination, x-ray of the heart, and an electrocardiogram indicated at least some abnormality of the heart in all three, less marked in case III, there being only slight questionable hypertrophy of the heart by x-ray and moderate left axis deviation by electrocardiogram, possibly caused by a high diaphragm. In case II the long duration, the close relation to meals and the absence of relation to exertion, the relief by soda and food as well as by nitroglycerin suggest a mechanism of a different sort than that described above, namely stimuli arising from spasm in the cardia or pylorus of the stomach in a nervous individual, causing referred pain, the pathway of which in the spinal cord is close to that of pain arising in heart or aorta, and with a distribution over an area usually indicating pain of cardiac or aortic origin. This possibility is clearly indicated by the last four cases, which are discussed below. This patient (II) died of unknown cause three months after last being seen.

Patients III and IV, on the other hand, who with patient II complete what may be called the doubtful group, were much relieved by therapy directed toward relief of intestinal spasm*. Of especial interest is the finding of a duodenal ulcer by x-ray in patient IV and the relief of a typical anginal attack by drinking a glass of milk. The age of these three patients and the findings of x-ray study and electrocardiogram indicate that the symptoms may be partially of cardiac and partially of gastric origin. Careful study and the effect of a continued gastric régime may clarify the diagnosis in such cases.

*Gastric Régime—Bland Diet and Belladonna
Tincture Belladonna gtts. VIII in water 15 minutes before each meal and at 9:00 P. M.

Bland Diet (Massachusetts General Hospital)

Breakfast
Cooked Cereal with sugar and cream—(2 ounces 20% Cream)
Egg—One, soft cooked or dropped
Toast—One slice, buttered
Milk—One glass

10:30 A. M.
Milk, Cocoa, Malted Milk or Eggnog—6 ounces
Crackers—Two

Dinner
Chicken Broth
Scraped Beef, Fricassee of Chicken, Minced Chicken with Fricassee Sauce
Potato, baked or mashed
Bread with butter—One slice
Custard or plain Ice Cream
Milk—One glass

3:00-4:00 P. M.
Milk—6 ounces
Crackers—Two

Supper
Cream Soup—6 ounces, different varieties
Rice, Macaroni, etc.
Toast—One slice, buttered—or Milk Toast
Apple Sauce, Prune Whip, or Simple Pudding

9:00 P. M.
Milk, Cocoa or Malted Milk—6 ounces

Patients V, VI, VII, and VIII all complained of low substernal or epigastric aching, pain or pressure definitely related to exertion or excitement as well as to meals, and with radiation in two usually considered characteristic of angina

pectoris of aortic or cardiac origin. In one patient the pain was continuous with paroxysmal exacerbations. Rest relieved in two. Amyl nitrite failed to relieve one, morphia being required. Nitroglycerin alleviated the attacks in two. Three of the patients were quite nervous.

Physical examination of the heart was negative in all four; two showed epigastric tenderness on examination of the abdomen. X-ray examination of the heart was negative in all. The electrocardiogram was essentially negative in three. Gastro-intestinal x-rays showed a flattened first portion of the duodenum and a filling defect in the gall-bladder shadow, suggesting with the Graham test, stone; another showed hypermotility of the stomach and intermittent pylorospasm, and a third showed a duodenal ulcer. The remaining patient, whose gastro-intestinal x-ray was negative, was so well on the gastric régime that he succeeded in running a half mile without bringing on an attack. This would seem to rule out anginal pain of aortic or cardiac origin in this patient. All four patients were almost entirely relieved by the gastric régime, including the use of belladonna.

The last four patients (V, VI, VII, and VIII) clearly show that referred pain simulating angina pectoris may be of gastro-intestinal origin and suggest that in certain older patients, even though some cardiac abnormalities are found, gastro-intestinal spasm may be wholly, or at least partially, responsible for the symptoms. Patients exhibiting this particular type of response appear to be of the nervous sort and may belong to that group of hypersensitive and hyperexcitable patients described by Alvarez[9], who suffer from a syndrome characterized by hypertonicity of all the sphincters of the body.

SUMMARY

One case is reviewed to illustrate what is frequently observed, namely, the cardiac or aortic origin of gastric symptoms.

Four cases are reviewed showing that referred pain simulating angina pectoris may be of gastro-intestinal origin and that much relief may be obtained from the use of a bland diet and tincture of belladonna.

Three cases are presented to illustrate the differential diagnosis between gastro-intestinal and cardiac or aortic origin of referred pain of anginal distribution. The importance of evaluating these two factors for the purposes of prognosis and treatment is emphasized.

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MALIGNANT LESIONS OF THE LARGE BOWEL*

BY FRED W. RANKIN, M.D.†

FROM the standpoint of its incidence carcinoma of the colon is entitled to respectful consideration for, including carcinoma of the rectum, it comprises 10 per cent. of carcinomas of the gastro-intestinal tract, and with hyperplastic tuberculosis and diverticulitis, forms the triad of diseases toward which surgery of the colon is principally directed. Even these criteria, however, fail to measure its significance from the standpoint of the individual patient. It is, therefore, a source of gratification to recount the substantial advance which has been made during recent years in diagnosis and treatment of this condition. Nor has progress been limited strictly to diagnosis and treatment, for although the prime cause of carcinoma of the colon, like that of all carcinomas, remains to be discovered, some ground has been gained in respect to its predisposing and contributing causes. I refer, in particular, to the relationship between polyps of the colon and carcinoma. That polyps of the large bowel are prone to malignant degeneration has heretofore been widely accepted, but judging from the results of work carried out by FitzGibbon and me, I am convinced that the frequency of this sequence has not been adequately appreciated. In this study it was found that, although certain varieties of polyps did not exhibit histologic evidence of potential malignancy, other varieties were at least of doubtful benignancy, and still others had frank cancerous or precancerous characteristics. All this by no means solves the problem of etiology, but rather, widens its scope, and it may well be that both benign and malign neoplasms have certain common, fundamental antecedents. But aside from all conjecture, whether profitless or profitable, not less than 140 cases have been recorded in which the association of polyps with carcinoma was fairly proved to be more than accidental. In the absence of scientific proof, I would not urge my views too insistently, but I strongly believe that most carcinomas of the colon originate in polyps. As a

*Read before the Springfield Academy of Medicine, Springfield, Massachusetts, April 14, 1931.

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corollary, I believe that multiple polyps, which are readily demonstrable by modern roentgenologic technic, should be surgically removed, even at the requirement of total colectomy, as a prophylactic measure against carcinoma.

FIG. 1. Annular carcinoma of the cecum.

As in other surgical diseases of the colon, the diagnosis of carcinoma rests on the anamnesis, the physical signs, and the roentgenologic mani-

FIG. 2. Polypoid carcinoma in the cecum and ascending colon (modified Fischer combined method).

festations. To evaluate them properly, however, account must be taken of the fact that developmentally, anatomically, and physiologically, the right and left halves of the bowel differ so much that the colon is virtually a dual organ. The right, or proximal, half of the colon develops with the small bowel, is large of caliber, has an absorptive function, and its content is more or less liquid. Carcinomas in this segment more often do not encircle the bowel. The left, or distal, half of the colon develops with the rectal portion of the intestine, is relatively small

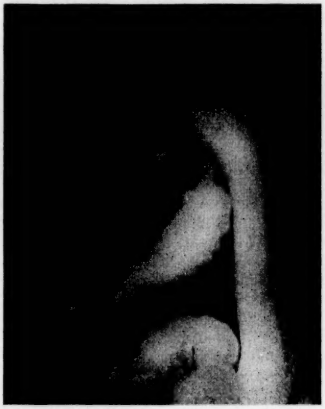

FIG. 3. Filling defect in the splenic flexure of the colon (transverse colon limb); carcinoma.

of caliber, has little if any absorptive function, and its content is usually more or less solid. Carcinomas in this segment more often encircle the

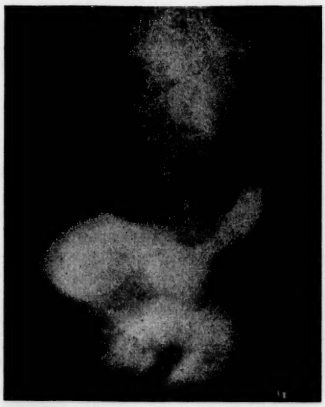

FIG. 4. Annular obstructing carcinoma of the descending colon at the level of the iliac crest.

bowel. As might be expected, therefore, carcinomas in the two segments, especially advanced growths, tend to differ symptomatically. It is exceedingly regrettable that most carcinomas, when recognized, have reached a fairly advanced stage. In probably more than 90 per cent. of

the cases, carcinomas of the colon, in their earlier stages, do not manifest marked or pathognomonic symptoms, and often are evidenced only by mucous diarrhea or alternating periods of diarrhea and constipation. Such symptoms should be taken as a signal for thorough and systematic examination of the colon, as a routine, and should be made a feature of periodic health examinations, if small and presumably early carcinomas are to be discovered more frequently.

Semeiologically, moderately advanced carcinomas of the right half of the colon may be classified in three groups: group 1, in which dyspepsia is the outstanding symptom; group 2, in which anemia and weakness without obvious reason is characteristic; and group 3, in which a practically symptomless tumor is discovered by the patient or in the course of examination. Group 1 is large because of the vagueness of the clinical manifestations; in many of these cases, pain and tenderness over the cecal region are the earliest symptoms, but are misinterpreted as indicative of subacute or chronic appendicitis. In group 2, which is also relatively large, the dominant symptoms are anemia and weakness, unexplained by the antecedent history and unaccompanied by visible loss of blood. The exact cause of the anemia is not clear, but it can reasonably be attributed to absorption of toxins by the impaired mucosa of the bowel. In extreme cases the concentration of hemoglobin may fall to 25 or 30 per cent. In cases of anemia without obvious reason it is common for clinicians to suspect malignant disease of the stomach and to emphasize the examination of that organ, but experience has convinced me that it is even more necessary to search for carcinoma of the colon. Silent, symptomless, or latent carcinomas of the right half of the colon constitute probably 10 per cent. of the total number of colonic carcinomas. Symptoms are either absent or so trivial that they are ignored, and the tumor is discovered only accidentally by the patient or is revealed by methodical examination of the colon.

Because of the small caliber of the bowel, the solidity of the fecal content, and the tendency of the growths to encircle the bowel, carcinomas of the left half of the colon are characterized dominantly by obstructive phenomena. The severity of the symptoms is in direct relationship to the degree and acuity of onset of the obstruction. In a small group of cases, about 5 per cent. of all cases of colonic carcinoma, obstruction comes on suddenly, without premonitory symptoms, and is complete. Whenever acute obstruction of the large bowel of an adult occurs and strangulated hernia and intussusception can be excluded, the chances are 10:1 that the causative lesion is carcinoma in the left half of the colon. Because a rapidly fatal condition is superimposed on a grave chronic lesion, this condition is particularly hazardous to the patient and difficult for the surgeon. Immediate relief is urgently demanded, and usually this is best effected by blind cecostomy; direct attack can be made on the carcinoma later when its localization is made possible by improvement of the

FIG. 5. Extensive annular carcinoma involving the sigmoid.

patient's condition. Subacute and chronic obstruction by carcinoma in the left half of the colon is manifested either by increasing constipation, alternating diarrhea and constipation, or irregularity of the alvine discharge. When the stenosis is progressive and is becoming marked, borborygmus is common and, especially in lean persons, the peristaltic movements of the bowel may be observable. Tenesmus and melena occasionally accompany carcinoma of the left half of the colon. The frequency of tenesmus is in proportion to the proximity of the growth to the rectal sphincter, and is not likely to occur at all if the carcinoma is above the middle of the sigmoid. The presence or absence of occult blood in the stool has little significance in the diagnosis of carcinoma, either in the right or left half of the colon. Bright red blood in the stool or on the surface of the stool, if seen repeatedly, is unquestionable evidence of a lesion distal to the splenic flexure. Dehydration, loss of weight and cachexia, often enumerated as indicating carcinoma of the colon, are scarcely to be regarded as symptoms of the carcinoma itself, but rather, as signs of metastasis and impending death.

Although certain combinations of the foregoing well-known symptoms and signs are often fairly diagnostic, careful roentgenologic examination is virtually indispensable for decisive confirmation of the exact situation of the growth and revelation of its size; it will often disclose also carcinomas the existence of which had not been surmised. The opaque enema should be em-

ployed. Examination should be roentgenoscopic. At the clinic, the roentgenologists, by modification and elaboration of Fischer's technic (inflation with air after partial evacuation of the enema) have been able to depict the topography of carcinomas in minute detail, and thus enhance diagnostic accuracy. Although numerous other lesions may enter into the differential diagnosis and thus occasion some difficulty, the percentage of errors by an experienced roentgenologist will be extremely small.

The diseases which manifest themselves, some constantly and others only occasionally, by filling defects are carcinoma, diverticulitis, tuberculosis, localized ulcerative colitis, encroach-

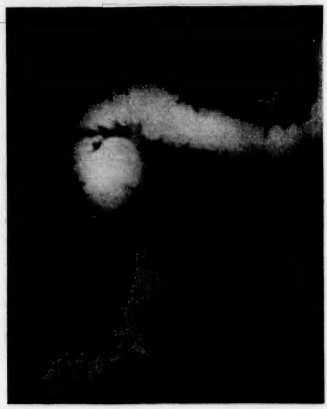

FIG. 6. Extensive filling defect in the sigmoid; carcinoma.

ments on the lumen of the colon by extrinsic processes, and inflammatory strictures. Roentgenoscopic observation after administration of the opaque enema is the method of choice in determining the presence of the filling defect and distinguishing its characteristics.

The filling defect of carcinoma of the colon is annular, polypoid, or obstructing. Each of these types may be attended with some degree of spasm, but all are characterized by the jagged irregularity of the narrow canal, by the abrupt terminations of the lesion, by the constancy of situation, and by their association with a palpable mass. When marked stenosis is present, the contours at the site of the obstruction may be rounded, or only a very fine canal may be seen. In the sigmoid, the roentgenologic signs of diverticulitis simulate those of carcinoma more closely than those of any other disease.

The filling defect produced by diverticulitis is spindle-shaped, its contours tend to be serrated in a regular fashion, rather than roughly jagged, and many or few of the extraluminal shadows of diverticula may be seen in other portions of the colon. The defect is produced by the mural inflammatory infiltration, attended with a more or less marked degree of spasm. The more acute and virulent the process, the greater the spastic manifestation. Not uncommonly there is an accompanying palpable mass which lacks the indurated, knotty character of a malignant growth.

Chronic ulcerative colitis, when it involves only a small segment of the colon, may simulate carcinoma in its roentgenologic aspects. The filling defect produced by chronic ulcerative colitis is usually comparatively long, the margins of the canal tend to be smooth rather than irregular, and the wall of the involved segment, although it is obviously thickened, remains relatively pliable. Hyperirritability of the involved segment is usually a prominent feature.

Extrinsic processes which encroach on the lumen of the bowel, and organic deformities, are not common; usually they do not present great differential diagnostic difficulty. The colon preserves a smooth outline, and the integrity of the mucosal contour usually can be demonstrated.

The hyperplastic type of tuberculosis of the colon usually affects the right side of the colon and thus may closely simulate the roentgenologic appearance of carcinoma. The filling defect usually extensively involves the cecum and ascending colon and has an irregular and corrugated outline associated with a peculiar, boggy consistence of the involved segments. Usually a portion of the terminal part of the ileum can be shown to be involved in the process. Only when an unusually short segment of the right half of the colon is involved with a tuberculous process, producing what is essentially a tuberculous stricture, does the differential roentgenologic diagnosis become difficult. Tuberculous enterocolitis is commonly secondary to chronic pulmonary tuberculosis and this association will occasionally be of value in making the differential diagnosis. As a rule, the long segment of cecum and ascending colon involved in the tuberculous process, the absence of a jagged appearance of the margins of the involved segment, and the tendency of the tuberculous process to become gradually terminated will be found to be adequate differential diagnostic signs.

At the clinic, a sustained effort has been made to reduce operative mortality, not merely to improve the appearance of the statistics, but rather to widen the field of operability. To effect these aims, it has been found beneficial to segregate patients with lesions of the colon, to place them under the combined care of clinician and surgeon, and to institute a series of preoperative, operative and postoperative measures as factors of safety.

Preoperative measures comprise: (1) rehabilitation of the patient; (2) reduction of intra-

colonic pressure in cases of obstruction; and (3) employment of intraperitoneal vaccination. At the time of admission, the resistance of most of these patients is lowered, often to a severe degree, and this state is accompanied by marked dehydration and toxemia. A diet low in residue and high in food value, comprising butter, eggs, rice, candy, and 20 per cent. fruit juices, is ordered. A large intake of fluids is insisted on, and frequently blood transfusion is indicated. To reduce intracolonic pressure, continuous rectal irrigation with a warm solution of sodium chloride is given, supplemented by mild purgation with fluid extract of senna. These measures

FIG. 7. Extensive filling defect at distal segment of the sigmoid, not due to the primary lesion, but to extrinsic mass of metastatic tissue from carcinoma of the ovary.

not only tend to lower intracolonic tension, but tend to reduce infection and inflammatory reaction in and about growths in the rectum and left side of the colon. A vaccine of streptococci and colon bacilli, prepared from patients who have succumbed to peritonitis, is given intraperitoneally, as a routine, three days prior to operation. It has been employed at the clinic in more than 500 cases, and I am confident that it has greatly reduced the percentage of fatalities from peritonitis.

Additional measures of safety include the following: (1) selection of an optimal time for operation; (2) choice of the most suitable anesthetic; (3) selection of an appropriate type of operation, with preference for procedures in multiple stages, and (4) adherence to a strict and standardized postoperative regimen. The circumstances of the particular case, and the accumulated experiences of the surgeon and the clinician, necessarily determine the choice of a favorable time for operation. In more than 80 per cent. of the cases, rehabilitative measures will produce decided improvement in the patient's condition, but the exact time for intervention is a matter for individual judgment. Even when measures of rehabilitation fail, the patient may be entitled to his chance of benefit from operation.

Although inhalation anesthesia may, in exceptional instances, offer a wider margin of safety, the employment of spinal anesthesia as a routine at the clinic, during the last four years, has deeply impressed me with its generally superior results. Conspicuous among its advantages, as is well known, are a bloodless operative field and abolition of peristalsis for thirty-six hours. It should be given, however, only by an anesthetist who is expert in its use and who watches closely during and after the operation for signs of lowered blood pressure or other untoward effects.

So many diverse and variable elements enter into the choice of operation for the individual case that this can be considered only in broad terms. The operation in multiple stages, for example, is such a potent factor of safety that I commend its more frequent employment; yet in certain selected cases, the operation in a single stage has obvious advantages, and may indeed be the less hazardous procedure. Before deciding on the type of operation, the abdomen should be thoroughly explored. I have found it advantageous to make the exploration in the following order: liver, aortic nodes, the nodes at the bifurcation of the iliac vessels, the pelvis, the growth and its adjacent lymphatics. By this exploration one may determine the extent of the growth, its degree of mobility, the condition of the lymphatics, and the presence or absence of complications, such as abscesses. It is especially important that exploration of the growth be reserved for the last step, lest infection be spread throughout the peritoneal cavity by the examining hand. It is equally important, also, that palpation of the growth be exceedingly gentle; otherwise an unsuspected abscess may be ruptured, and resection may be forced at an undesirable time.

For carcinoma of the right half of the colon I feel that aseptic ileocolostomy between the terminal portion of the ileum and the transverse colon, followed by resection of the right segment at the same stage or subsequently, is the operation of election. My preference is for end-to-side anastomosis, rather than for lateral anastomosis, for I consider the former method superior in by-passing the fecal current. Whether the operation shall be completed in one stage, or whether extirpation of the growth shall be deferred to a subsequent stage, must be determined by the circumstances of the individual case, without prejudice from personal or economic considerations. In about half of the cases, the operation in a single stage is applicable without enhancing the risk, but it is a formidable procedure, and should be reserved for sturdy patients, with high general resistance. If resec-

tion is postponed to a second stage, experience indicates strongly that the interval should be a considerable one. After the preliminary anastomosis is made, the second step is readily performed by mobilizing the segment, dividing it, and turning in the cut ends. Occasionally decompression, after ileocolostomy, is highly desirable. It may be effected by an ileostomy of the Witzel type applied to the terminal portion of the ileum; or, after resection and turning in the cut ends by a purse-string suture, the catgut may be left long and brought out through the angle of the wound, thus serving as a guide for puncture of the bowel on the fourth day, if the intracolonic pressure has increased unduly.

For carcinoma of the left half of the colon, two procedures of choice are offered: (1) preliminary surgical drainage followed by resection and anastomosis in two stages, or (2) obstructive resection, that is, resection in one stage, with temporary obstruction of the cut ends of the bowel by clamps. If obstruction by the carcinoma is acute, and if the bowel is edematous and distended, preliminary drainage, either by cecostomy or by colostomy, proximal to the growth, is urgently necessary. Later, resection of the growth and anastomosis may be performed in two stages. This emergency procedure will be required in relatively few cases. In the majority of cases, obstruction by the growth is mild or has been largely relieved by preoperative measures, and resection in one stage, but without anastomosis, is preferable. I do not think that primary anastomosis should be carried out, except in rare instances, and then it always should be preceded by cecostomy. Obstructive resection is a radical operation, which embodies the desirable features of the Mikulicz operation, and is attended with low mortality. The original Mikulicz procedure has a high mortality and was followed by recurrence in the abdominal wall in 12 per cent. of the cases because it did not permit wide excision of the lymphatics that drain from the growth. To carry out the modified operation, the affected segment of the colon is mobilized down to the middle of the sigmoid by dividing the bloodless outer leaf of the peritoneum and rotating the bowel mesially, at the same time wiping the nodes and the fat of the mesentery inward. The vessels are ligated close to the root of the mesentery, and as large a block of tissue as is feasible, including the carcinomatous bowel, is removed. The clamp on the cut ends of the bowel is left closed for at least forty-eight hours, and preferably for sixty to seventy-two hours; then the proximal blade is opened to permit the escape of gas. On the distal loop the clamp is allowed to remain until it falls off as a result of pressure necrosis, usually about the seventh or eighth day. Two blind "gun barrels" remain, much as in the original Mikulicz operation; when the septum between them is severed by an enterotome, spontaneous healing occurs in most cases, provided that the mucosal surface is not attached to the skin and everted, and sufficient time is allowed before attempt is made to close the opening that was made at colostomy. This should ordinarily be from six to eight weeks; the longer the wait before attempt at closure, allowing full opportunity for subsidence of inflammatory reaction about the colostomy, the better is the chance of success at the first attempt. I have employed obstructive resection in a large series of cases, with a mortality of 5 per cent. and I regard it with increasing favor. It is not applicable, of course, in the face of continued obstruction by the growth; in such an event, preliminary operations for decompression are imperative.

At the clinic, in 1929, by the methods described, the mortality rate for operations on the right half of the colon, which were chiefly for carcinoma, was 8.7 per cent. For operations on the left half, the rate was 7.4 per cent. Although these percentages may be considered satisfactory, I would point out that comparison with similar statistics is likely to be fallacious, and that a low death rate is often not a true measure of success but an index of an unduly restricted field. It will be agreed that efforts to reduce operative mortality are laudable, and it is gratifying that the four avenues to this end, early diagnosis, careful preoperative preparation, improvement in surgical technic, and meticulous postoperative care, are constantly being widened. But it is vastly more important that the field of operability be widened to its utmost practicable limits, even at the expense of a considerably higher rate of mortality. Notwithstanding the many difficulties and discouragements attending surgery of colonic carcinoma, they are not insuperable, and the end results of successful extirpation are superior to those following removal of carcinoma elsewhere in the alimentary canal. Certainly, common sense forbids attempts at operation on moribund patients, but no patient who has a chance of benefit from operation should be denied the treatment that the surgeon would elect for himself.

DR. R. P. STRONG HAS FOUND THE CAUSE OF MANY CASES OF BLINDNESS IN GUATEMALA

Dr. Richard P. Strong, Professor of Tropical Medicine at the Harvard Medical School, who headed the expedition from the Department of Tropical Medicine of Harvard University and that of the United Fruit Company, has reported the results of successful studies of onchocerciasis, an infestation by a small black fly.

The embryos permeate the system of the victim and concentrate in the lymphatics of the eye, which causes blindness.

Removal of the adult parasite and the administration of a derivative of quinine clears the system of the embryo parasites.

Dr. Strong is confident, according to comments in the daily press, that four or five medical men could in the course of a few years eradicate the disease and suggests support by philanthropists for this and other forms of public health work in Guatemala.

AN UNUSUAL CASE OF EPIDERMOID CARCINOMA OF UTERUS AND FALLOPIAN TUBES*

BY JOHN A. FERGUSON, M.D.‡

THE following case of epidermoid carcinoma of the uterus and fallopian tubes is of considerable interest because of the unusual character and sequence of the tumor growth, and because of the influence which radium may have exerted in determining its behavior.

CASE HISTORY

A well-developed and nourished white widow woman, aged 40 years, complaining of lower abdominal pain, vaginal discharge, and weakness, was admitted to the Palmer Memorial Hospital in November, 1930. Her present illness began two years before, at the age of 38, when a vaginal discharge was first discovered. At first the discharge was

FIGURE 1. Original curettings from the cervix, taken before the radium therapy, showing epidermoid carcinoma. × 100.

thought to be due to cervical erosions and lacerations. A short time later, as a result of a biopsy and curettage, the patient was found to have a malignant disease, appearing as carcinoma in the cervix and an adenoacanthoma in the fundus†. Four heavy radium treatments were given at this time. Following these treatments the patient improved and the discharge ceased, returning two months prior to her entry into the Palmer Memorial Hospital, which was about two years after the radiation of the cervix and uterus.

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†We wish to thank Dr. Kingsford of Dartmouth Medical School, who made the original diagnosis, for sending us the microscopic slide of the cervix.

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Physical examination on admission to the Palmer Memorial Hospital revealed a well-developed and nourished woman. There was marked tenderness in the lower right quadrant of the abdomen. In the left inguinal region, just above the center of Poupart's ligament and lateral to the left border of the rectus muscle, there was an area of exquisite tenderness. In the right lower quadrant, one inch above the middle of Poupart's ligament, an intra-

FIGURE 2. Cervix two years after radium therapy, showing sclerosed vessel, hyalinized stroma and partial obliteration of canal. × 100.

abdominal mass the size of a hazel nut could be palpated.

Vaginal examination under ether by Dr. G. A. Leland showed an irregular but symmetrically enlarged fundus. On the left side there was a tumor, which seemed to resemble an enlarged tube or an intraligamentous tumor of a fibrous or cystic character, rather than malignancy. The uterus was freely movable, also the tumor mass in the left side, which was firm but not hard.

Pan-hysterectomy was performed by Dr. G. A. Leland in November, 1930. No metastases were found and recovery was uneventful.

Gross description of uterus and adnexa, path. No. 10324: Uterus symmetrically enlarged, measuring 9 cm. from the fundus to the cervix, 8 cm. laterally at fundus by 5 cm. in thickness. The serosal surface was regular and smooth. The myometrium measured 2.7 cm. in thickness and appeared negative. The cavity was dilated and filled with yellowish cloudy fluid material. The endometrium was roughened and numerous thin-walled cyst-like masses were spread over the surface. These masses contained material similar to that found in the cavity of the uterus. The cervical canal was almost obliterated. The external os was hard and smooth, measuring 2 cm. in diameter. The tubes were fairly

thin-walled and considerably dilated, measuring, on an average, 3 cm. in diameter and 7 cm. in length, but were markedly constricted at the inner part of the isthmus. The serosal surface was smooth and shining.

On section the lumen was filled with yellowish fluid material similar to that found in the cavity of the uterus. The material in the tubes spurted out when a section was made. The right ovary appeared negative. The left had been removed some years previously.

FIGURE 3. Uterus showing surface character of growth. × 75.

Microscopic examination of cervix: There was a marked hyalinization and fibrosis of the cervix. The scar tissue showed some infiltration with lymphocytes and plasma cells and an occasional polymorphonuclear leucocyte. The lining of the cervical canal in the few places where it was not completely obliterated was composed of a single layer of low columnar epithelium. The blood vessels showed marked hyalinization and there was no trace of tumor growth in any part of the cervix.

Microscopic sections through the fundus showed, on the surface, a malignant growth of squamous epithelium. In many places there was some infolding of the epithelium, but little actual invasion of the myometrium. The nuclei of the tumor cells were large and vesicular. The cells varied in shape, many being drawn out in spindle form, while others were round and about 8 to 10 micromillimeters in diameter; others were larger, measuring about 12 to 15 micromillimeters in diameter, with large nuclei having one to two nucleoli. Mitotic figures were very numerous. Many multiple mitoses were found. The cytoplasm of most cells was bluish staining, but toward the center of the cell masses, where the cells were more definitely outlined, the cytoplasm took a reddish tint. Some of the cells with the reddish cytoplasm measured from 14 to 25 micromillimeters in diameter. These cells were undoubtedly secreting keratin. In a few areas rather indefinite intercellular bridges were identified. There was no pearl formation. In the central part of the epithelial folds there were numerous polymorphonuclear leucocytes, eosinophils and débris.

Sections through the fallopian tube showed a replacement of the columnar epithelium with malignant squamous cell epithelium. In some places only a single layer of squamous epithelium lined the tube. The wall of the tube was greatly thinned and showed no points of invasion. The lumen contained eosin staining débris with some broken down cellular elements, apparently derived from necrotic tumor cells. The appearance of the tumor cells was similar to that in the uterus. Serial sections taken through each fornix of the uterus, including the intramuscular part of the fallopian tubes, did not show tumor growth but showed a normal mucosa. There was no direct continuity of tumor growth between the cavity of the uterus and fallopian tube.

The following is a summary of the important findings in this case:

1. The disappearance of the epidermoid carcinoma of the cervix following radium therapy.
2. The disappearance of the adenoacanthoma of the fundus, as such, and its replacement by a surface growth of malignant squamous epithelium, which could not be classified as an adenoacanthoma.
3. In the fallopian tubes a surface growth of atypical squamous epithelium similar to that found in the uterus replaced the normal tubal epithelium, except for the intramuscular portions of both tubes.

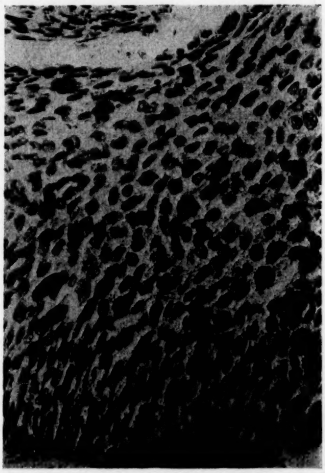

FIGURE 4. Uterus showing section through the epidermoid carcinoma which completely replaced the endometrium. × 250.

4. No continuity of tumor growth between the fundus and tubes.
5. The enlargement of the cavity of the uterus and dilatation of the tubes by the accumulation of yellowish keratinous and cellular débris, due to postradiation stenosis of the cervical canal.

DISCUSSION

The fibrosed cervix with no trace of epidermoid carcinoma was undoubtedly due to radium therapy. (On reviewing the original slide from the cervix taken prior to the radium therapy it

corresponded to an average Grade II epidermoid carcinoma.) The adenoacanthoma of the fundus, which was diagnosed from curettings taken at the same time as the original biopsy from the cervix, disappeared as such. There was little resemblance between the tumor growth found in the uterus following the hysterectomy and an adenoacanthoma. Ewing[1] states that at least three primary acanthomas of the corpus have been described, all in elderly women. The growth in the fundus and tubes in this case was unquestionably epidermoid carcinoma. One cannot say that the radium therapy had caused the disappearance of the adenoacanthoma. No recorded case has been found where an adenoacanthoma disappeared following radium therapy, but, on the other hand, the two year interval between the diagnosis of adenoacanthoma of the fundus and the subsequent hysterectomy, which showed no invasion of the myometrium or metastasis, is too long a period for an adenoacanthoma to remain localized. So it seems that the most probable sequence of pathological changes was that the radium caused a marked modification of the adenoacanthoma. The glandular part disappeared completely and the squamous cell part became changed from a rapidly growing invasive type of tumor to a much more benign form with little tendency to invasion and a growth almost purely surface in character.

The carcinoma of the fundus could not be graded with any degree of accuracy. It had more of the appearance of a Grade II, and yet its clinical behavior was much less malignant than the average Grade II. The surface growth, with little tendency to invasion and which seemed in places to follow the course of the endometrial glands, suggests the epithelial metaplasia which Kaufmann[2] has stated sometimes occurs in elderly women and when the keratinous débris in the cavity is taken into account the picture resembles somewhat cholesteatoma of the uterus, as described by Kaufmann. In 3,000 uteri examined at this hospital, which were selected from autopsy and surgical material, no squamous cell metaplasia of the uterine mucosa or primary epidermoid carcinoma of the fundus was found, which adds weight to the belief that the finding of an epidermoid carcinoma, which has completely replaced the uterine mucosa with practically no tendency to invade the myometrium, is rare.

The surface growth of squamous cell epithelium in the thin-walled fallopian tubes without any direct continuity of tumor growth between them and the carcinoma of the fundus is an unusual finding. Direct extension of corpus carcinoma into the tube has been described by Lanceraux[6]. One would have to consider the possibility of a tumor embolus being forced through the intrauterine part of the tubes, which has been suggested by Sitzenfrey[7] as a means to account for certain carcinomas of the tube. The possibility that the tumor growth in the tubes is a primary malignant metaplasia cannot be ruled out, though malignant epidermization of the epithelium of the fallopian tubes is very rare. Holland[3] found one primary epidermoid carcinoma of the fallopian tube out of a series of 10,000 tubes. In his series there were eight carcinomas of the tubes secondary to malignant disease of the fundus, but none were of squamous cell type. No squamous cell metaplasia or epidermoid carcinoma has been found in a series of 3100 tubes examined in the pathological laboratory of the Palmer Memorial Hospital.

FIGURE 5. Showing surface growth of malignant squamous cell epithelium in the fallopian tube and the cellular débris in the lumen. × 250.

L'Esperance[4] reports a case of primary plexiform carcinoma of the tube with areas resembling skin. Other cases of primary epidermoid carcinoma of the tubes have been reported. This would lead one to believe that primary malignant squamous cell metaplasia of the tubal epithelium, while extremely rare, is more common, however, than epidermoid carcinoma of the tube, which is secondary to epidermoid carcinoma of the fundus.

The thin layer of squamous epithelium lining the dilated tubes, when considered with the yellowish keratinous and cellular débris in the lumen, and also, but not so marked, a similar appearance in the cavity of the uterus, suggests somewhat the picture that has been described as occurring in the uterus in guinea pigs on a vitamin A deficient diet[5].

In spite of the fact that the possibilities as to etiology mentioned cannot be definitely excluded, it seems most probable that the epider-

moid carcinoma of the tubes is secondary to the malignant disease of the fundus.

SUMMARY

A case of epidermoid carcinoma of the uterus and fallopian tubes is reported which shows an unusual sequence of events following radium therapy.

Two years after four radium treatments were given for an epidermoid carcinoma of the cervix and an adenoacanthoma of the fundus a hysterectomy was done. No extension of the disease or metastasis was found. The cervix was fibrosed and showed no trace of the original epidermoid carcinoma. The adenoacanthoma had disappeared and was replaced by a surface growth of malignant squamous cell epithelium, which showed practically no invasion of the myometrium and no pearl formation. The cavity of the uterus was filled with yellowish keratinous débris; there was no continuity of tumor growth between the fundus and fallopian tubes. While the epidermoid carcinoma of the fallopian tubes was most likely secondary to the disease of the fundus, the possibility of a primary malignant squamous cell metaplasia of the tubal epithelium could not be ruled out, nor could the possibility of a tumor embolus being forced through the intrauterine part of the tube into the isthmus.

The gross, and to some extent the histological, resemblance of the uterus and fallopian tubes of this case to those of guinea pigs on a vitamin A deficient diet is interesting.

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DIAPHRAGMATIC HERNIA IN AN ADULT

BY P. E. TRUESDALE, M.D.†

A REVIEW of the recent literature on diaphragmatic hernia shows no abatement in the number of cases reported and no waning of interest in the subject. An increasing number of writers regard as very important all observations which are made on the innervation of the diaphragm. Further study is encouraged on its relations with adjacent organs and the effect of its motion on the heart, lungs, and abdominal viscera under normal and abnormal conditions.

There is now very little doubt that hernia of the diaphragm as observed in the adult is a deformity of developmental origin. Ample evidence is available to substantiate this opinion.

Hernia of the stomach through a paraesophageal aperture is a typical example of this structural defect during embryonic life. Other areas have been observed where there has been congenital failure of the muscular segments to unite. After birth the stomach, or more often the cardiac portion of it, passes through this opening, where fusion of the musculofibrous segments of the diaphragm has remained incomplete. Powerful suction within the thorax during respiration carries a part of the stomach above the diaphragm at this point. In so doing the serosa, serving as a thin septum, is pushed upward into the thorax and forms a sac.

In the first stage of transposition the stomach is involved in a true hernia of the congenital type. There are some individuals who carry hernia in this form throughout life with little or no discomfort; the disturbance, if any, is so slight that the patient does not seek medical aid. On the other hand, it may cause substernal distress or it may be found associated with ulcer on the lesser curvature of the stomach, as appeared in one of our recent cases.

In the second stage of elevation of the stomach we find great distention of the sac and a protrusion upward of a large portion of the stomach. The constricted area is at the diaphragm, thus giving an hourglass appearance (Fig. I). Individuals with hernia of this degree are embarrassed by its presence. They have epigastric pain, irregular in occurrence but more frequently soon after deglutition. This pain may be so variable in time and severity that its cause escapes detection more often than other pain-producing ailments in the upper abdominal region. As the stomach continues to pass up and down, the aperture becomes enlarged until, from some form of external violence, the entire stomach is forced into the pleural cavity, often causing rupture of the sac. In this final stage the stomach may carry with it the transverse colon and the spleen. With continued suction the small intestine finds its way through the aperture, thus creating all the elements favoring the occurrence of intestinal obstruction.

Whenever this amount of room in the chest is occupied by hollow viscera, there are intermittent attacks of dyspnea and distress. The pain is not acute but oppressive. Severity of the dyspnea depends upon the amount of distention of the incarcerated hollow viscera and upon the consequent degree of cardiac embarrassment and extent of lung collapse.

CASE REPORT

L. M., a female, aged 52, was admitted to the hospital on December 4, 1929, with a tentative diagnosis of cholecystitis. Her history of stomach trou-

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ble dated back two years, when she was seized suddenly with a severe pain in the epigastric region. This pain persisted, and she was obliged to remain in bed for a few days. Since this she had had epigastric pain after eating, especially if her food contained fats. The pain frequently radiated to the left shoulder and for the past three weeks had extended down the left arm to the hand. She had been on a rigid diet and had lost forty pounds in two years. She was often nauseated but seldom vomited. She belched gas and was "bilious". Her appetite was good but she did not eat because of the discomfort which followed. She stated that she had been examined with the Roentgen ray. The report received was that she had a "fallen stomach".

The patient was married and had five children, three of whom are living and well. One died in infancy of stomach disease, while the second child died at the age of four years from peritonitis. Her family history was good. In 1925 she had a panhysterectomy for uterine hemorrhage.

After the preliminary examination a tentative diagnosis of gall bladder disease was made. The Wassermann test was negative. The blood smear did not vary from normal. No abnormal elements were found in the urine. After a cholecystogram the gall bladder was thought not to be involved. On December 5 the x-ray examination of the stomach indicated the presence of a diaphragmatic hernia on the left side with nearly one-half the stomach above the diaphragm (Fig. I). The colon was not involved.

Operation — December 9, 1929 — Thoracotomy and reduction of diaphragmatic hernia with repair, under pressure anesthesia. The patient was placed on her right side with left arm suspended. The table was tilted forward, raising the head about 10° to 15°. Nitrous oxide-oxygen anesthesia was given by Dr. Albert Miller.

A transverse incision was made from the posterior axillary line to the costal sternal cartilages, exposing the sixth, seventh and eighth ribs. The incision was carried through the intercostal space, opening the pleura along the entire distance. The seventh rib was severed at the posterior and anterior extremity of the incision. This rib-flap was then turned upward. By means of a rib retractor the contents of the thoracic cavity were fully exposed. The left lung was walled off with wet gauze pack.

A large paraesophageal hernia of the diaphragm was found, involving the upper half of the stomach. It was covered by a thin, serous membrane which was evidently pleura. The hiatus in the diaphragm extended outward for about 4 cm. and readily admitted the tips of three fingers. The sac, which extended up behind the pericardium, was opened. Withdrawal of the fundus of the stomach was made difficult by adhesions which had been formed with the sac at its upper portion, where it had become attached and fixed.

After reduction of the stomach to its position within the abdomen, the edges of the aperture in the diaphragm were approximated with interrupted double strands of chromic catgut. This was reinforced with a layer of single strand catgut and the whole line of suture covered over by a running suture of black silk. This latter suture was also employed to obliterate the sac by imbrication. The gauze pack was then removed. The lung quickly descended to the diaphragm, maintaining a condition of full expansion under the pressure method of anesthesia until the thoracotomy wound was closed. Respirations, which had been somewhat labored during the operation, became quiet as soon as the thorax was closed.

The convalescence of this patient was marked by an irregular temperature, ranging from 99° to 102° for the first week. There were no complications during the convalescence period, and the patient was discharged on January 1, 1930, 23 days after operation. A roentgenogram was made before the patient was discharged (Fig. II). Seventeen months after operation this patient was found to be entirely well.

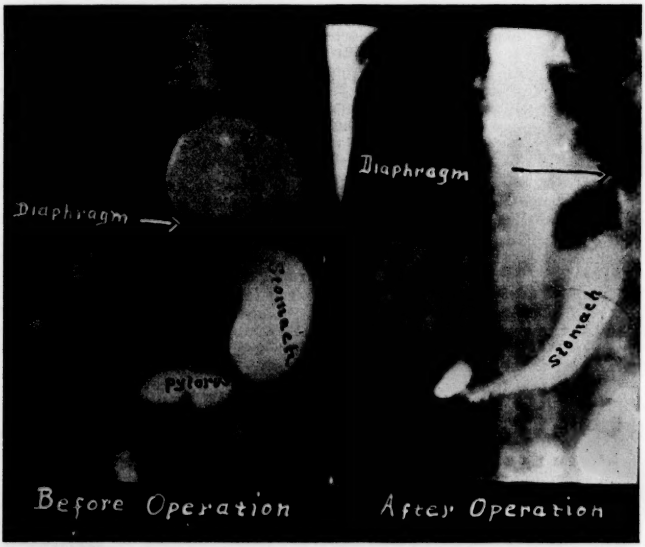

FIG. I. FIG. II.

GRANULOMA INGUINALE*

Case Report

BY ALFRED C. REED, M.D.†

GRANULOMA INGUINALE is also called granuloma venereum, and ulcerating granuloma of the pudenda. No satisfactory name is available largely because its etiology cannot be considered definitely established. It is frequently confused with climatic bubo, especially in German reports. A clear terminology would help to clarify this confusion. Granuloma inguinale characteristically does not involve lymph glands. It is noted for its chronicity, resistance to treatment and scarring. It has usually been considered rather strictly tropical and of only sporadic incidence in the United States. Howard Fox (1926) collected 150 reported cases in the United States up to that date. He concluded that the disease was endemic in the southern states and also to a smaller degree in the north. He believed that the incidence in the United States was much greater than indicated by the figures of reported cases. Since 1926 various observers have made reports confirming these conclusions. This is a matter of importance as the disease is evidently sufficiently common to need identification all over the United States.

Etiology. Donovan and a long succession of other workers have described an organism in large mononuclear cells in the lesions, which is now usually referred to as the "Donovan body." This is considered by some as a specific causative parasite, has been recovered by culture on Sabouraud and other media, and on injection into mice and rabbits produces abscesses or infiltrated nodules. Others, including Manson-Bahr, believe this organism is not causative but a common secondary invader. Ernest L. Walker (1918) at the Hooper Foundation of the University of California has identified the "Donovan body" as a capsulated intracellular bacillus, *B. Mucosus capsulatus,* a member of the Friedländer group. It has the appearance of a short rounded bacillus, one micron in length. Walker concluded that it was constantly present in granuloma inguinale and while it was the essential etiologic agent, it was probably a secondary infection with the capsule bacillus of lesions of other origin which may be venereal sores. The case here reported is in line with this suggestion.

Donovan bodies are found in the majority of cases where deep curettings or tissues are examined. McIntosh (1928) holds the Donovan body to be the factual cause of the disease and reports the production of typical granuloma inguinale in a volunteer by injection of these bodies. On the whole, the causative relation of the Donovan bodies or any other definite organism to this disease needs more ample confirmation and study. Pending such study, we can safely consider that Donovan bodies are frequently present and add some measure of assurance to the diagnosis.

Clinical Survey. Granuloma inguinale is most often seen in negroes and in a high percentage of cases originates as a venereal disease. The 150 cases assembled up to 1926 by Fox (vide supra) were mostly in negroes, were often contracted by sexual contact and usually affected the groins and genitalia. Fox states in this series that, in all males affected, some portion of the penis was involved. M. N. Thierfelder (1927) reviewed 6,000 cases in Dutch South New Guinea (Negroids) in 1923-6, and found only two cases of true extra-genital origin. In a review of the literature Thierfelder found only one case (Maitland, 1899) of extra-genital infection. This case originated in the mouth and a venereal origin could not be excluded. On the contrary, Campbell (1927) did not observe evidence of transmission by sexual intercourse in any of his 18 cases, and concludes that it is definitely not a venereal disease.

The disease usually begins in the region of the groins or genitalia as a nodular infiltration of the skin. The raised surface tends to excoriate easily with superficial ulcers which bleed on slight provocation. Suppuration is not characteristic but usually follows secondary infection. The lesion spreads by contiguity and also jumps to new locations as illustrated in the case report below. This latter may be by autoinfection. There is much scarring. The process is extremely chronic, slow and its onset most insidious. While the disease is strictly local, the process of scarring may lead to lymphatic obstruction. General health is not affected and the glandular system is never involved. The pathology is well covered in the case reported herewith.

Treatment. Shattuck, Little and Coughlan (1926) report favorably on three cases treated with triamide of antimony thioglycollic acid. X-ray is frequently reported as a valuable adjuvant.

The usual specific treatment is with tartar emetic. This can only be given intravenously. Several points in its use need emphasis. Ordinarily a one per cent. solution is administered. A two per cent. solution is equally satisfactory and cuts in half the volume necessary. In Egypt, a six per cent. solution is used in the wholesale treatment of urinary schistosomiasis. The solution is intensely irritating and special

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care is always necessary to avoid getting any of the solution outside the vein. Using a two per cent. solution, a 5. c.c. syringe with a needle just large enough to permit reflux of blood from the vein, should be selected. The needle should be wiped off with alcohol just before injection. A small, sharp needle, and definite reflux of blood drawn back into the syringe, with a minimal volume of solution (higher percentage) insure a clean and safe administration.

Should any of the solution escape the vein, a burning pain is produced and a sterile abscess is apt to form. This can be aspirated and an alcohol-glycerin dressing applied. Necrosis may follow a larger amount of extravenous solution. Frequently the patient will complain of some burning pain up the course of the vein, followed by tightness in the chest, cough, and nausea or vomiting. Slow and careful injection, and very gradual increase of dosage, not more than three times per week, help prevent this minor reaction. The patient should lie down for at least three hours after the injection and should not have eaten within four hours preceding the injection.

The initial dose should not exceed a weight of .030 g. (grains ½). This can gradually be increased to a maximum single dose of 0.100 to 0.150 g. (about 2 to 2½ grains). The total dosage for the course ought to be at least 25 grains (1.5 g.) and may well reach 30 or more grains. Thierfelder (1926) on the basis of 5,000 cases treated in New Guinea with one per cent. solution, advises that a single dose of 0.15 g. may cause muscular cramps and collapse. A smaller dose may at times result in cough or vomiting. He believes that larger doses add nothing in effectiveness, and merely increase the risk of venous thrombosis. Longer intervals between treatments decrease the action of the drug. Thierfelder found that daily injections led to cachexia and too small doses over a long period of time resulted in paralysis. He also found children more tolerant of the drug than adults.

Tartar emetic solution should be fresh, sterilized by short, cautious boiling only, and perfectly clear, by filtration if necessary.

Protein shock is indicated because of the chronic course with little tendency to spontaneous healing, the lack of constitutional symptoms, and the lack of quicker specific treatment. The usual precautions must be observed in regard to normal temperature, cardiorenal disease, hypertension, incipient tuberculosis, etc.

CASE. G. B. Seaman, aged 29. White. Single. Entered Tropical clinic September 25, 1929.

Present Illness. 12 years ago was in a small-boat crew rowing in races in the North Sea. "Salt-water blisters" developed on each buttock, ascribed at the time to irritation from hard rowing seat and perspiration. These were opened with a needle and drained. The lesions apparently healed but recurred in one month in the same form and location. This process was repeated for one year, during which some deep infiltrations were felt. The lesions were then "lanced", when they disappeared for a longer period, finally again recurring. Four years after onset, curettement was done, and up to the date above 14 excisions were performed, with drainage. Similar lesions gradually developed and are now seen in the axillae, on the neck, behind both ears, on one cheek, on both knees and inner aspects of the legs and on the lower half of the abdomen. At no time were the genitalia involved, although groins and perineum have at times been included. The lesions seem to appear at points of pressure. No glandular involvement was ever noted. The deep firm infiltrations would apparently "break" beneath the skin, then through the skin, and discharge serum. He has had periods of 6 to 12 months with no open lesions. The infiltrated areas were often painful. General health was not affected and fever was never noted.

During the twelve-year period, the diagnosis had been made constantly of furunculosis. Treatment had included the following:—Autogenous vaccine, 360 injections, 14 surgical excisions, stock vaccine (type unknown) 6 injections, insulin 3 injections (blood sugar was said to have been high), salvarsan 8 injections, various diets, mercurochrome 3 intravenous injections, several milk injections, autohemic injection, potassium iodide by mouth, various oils by mouth, and x-ray. The Wassermann has been repeatedly negative and is now negative.

Family History. Complete, healthy and irrelevant.

Past History. Born in Missouri, 2 to 16 years of age in Oklahoma, 16 to 29 years of age at sea, visiting the Caribbean Sea, South America, Pacific Islands and the North Atlantic. He had typhoid and pneumonia at 10, and mumps, measles and varicella as a child. He gave a history of occasional tonsillitis, and had never had scarlatina, diphtheria, acute rheumatism, dysentery or any other acute illness. He had no history of any venereal infection. This was stressed to him; he was a man above average intelligence and had no motive for concealment and every inducement to give a full history in the hope of relief from his present illness.

He suffered a fractured rib at the age of 15, had a tonsillectomy somewhat later and appendectomy without very acute or severe symptoms. Aside from moderate constipation and occasional headaches, he gave no history of systemic symptoms. He is inclined to be somewhat nervous and over-alert. His average weight is 176 lbs., now is 170 lbs.

Examination. Adult male, well-nourished and well-developed, and apparently in good health. Except for the points noted, examination was entirely normal and negative. Tonsils had been removed. Teeth were in poor condition. Anterior cervical glands were palpable. The liver could be felt at the costal edge, neither enlarged nor tender. The only other abnormal findings were in the skin. There was some acne vulgaris on the back. There were scars and subcutaneous masses of firm infiltration under both arms, back of both ears, over both lower quadrants of the abdomen, on both buttocks, on the perineum, and the inner surface of the right thigh. One such area in the left lower quadrant was discharging purulent material through an opening 1.5 cm. in diameter. Temperature, pulse and respiration were normal. There were no abnormalities of the nervous system. Weight 176 lbs. Height 6 feet, 1 inch. Blood pressure average 110/60.

Laboratory Data.

Blood Count:—Hemoglobin, 85% (Sahli). Red cells 5,060,000. White cells total 13,200. Polynuclears 79%, Lymphocytes 20%, Large mononuclears 1%.

Urine:—was normal.

Wassermann:—repeatedly negative.

Biopsy:—By Department of Pathology, University of California Medical School, San Francisco, California:—

Tissue consisted of a small bit of skin.

Microscopic: Sections show the edge of an ulcer in which there is a chronic granulomatous lesion. There are several small accumulations of cells mostly plasma cells in pockets partly surrounded by fibroblastic tissue. At the edge of these accumulations a few large phagocytes are seen, some of which are vacuolated and some contain fragments of foreign material. With Giemsa stain many bacteria are found in and outside of the cells. Some of these correspond morphologically with the so-called Donovan bodies. Their exact nature, however, cannot be determined.

Diagnosis: Chronic inflammation (Granulomatous lesion) of the skin.

Cultures:—Bacterial cultures from subcutaneous tissue, ulcer and exudate, showed only ordinary pyogenic organisms with predominance of staphylococci. Culture of biopsy tissue and deep curettings on Sabouraud medium gave no growth.

Diagnosis: Granuloma inguinale (G. vereum).

Treatment: A combination of intravenous tartar emetic and protein shock was used, the duration of treatment extending over a total of 4½ months. Definite improvement was seen late in the course, and reached a maximum 2 months after termination of treatment, resulting in cure. At the same time the pustular acne on the back was controlled and has largely disappeared. During two and a half weeks in hospital at the beginning of treatment, 2% tartar emetic solution was given intravenously, beginning with 0.040 g. of the drug (2 cc.) and increasing each third day to a maximal single dose of 0.120 (6 cc.). A total of 13 injections of tartar emetic were given, containing a total of 1.320 g. or 22 grains. During the first week in hospital, in addition but on different days, three protein shocks were given by means of typhoid vaccine intravenously. The reactions were attended by sharp chills, and temperature of 102° F. to 104° F.

SUMMARY OF CASE

Unusual Features. This case was in a white man, originated on the North Sea distinctly out of a tropical climate, and was positively non-venereal. The genitalia were not involved. The primary infection appeared on both buttocks as "blisters", after the patient had been rowing. For twelve years the condition was diagnosed and treated as furunculosis. Cure followed specific treatment with tartar emetic and protein shock.

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OIL AS A CYSTOSCOPIC MEDIUM*

BY BORIS E. GREENBERG, M.D.†

THE purpose of this paper is to call attention to a procedure which has simplified and made possible some of the more difficult cystoscopic examinations and operations.

The use of a watery cystoscopic medium, such as boric acid solution, has its disadvantages, since the fluid mixes freely with both blood and pus, clouding the medium, preventing the proper dispersion of light, and fogging the lens. In cases of tuberculosis of the bladder, the above-named factors make it difficult to locate the ureteral orifices for the purpose of catheterization. In various tumors of the bladder, the bleeding may be so profuse that in spite of frequent irrigations only a fleeting glance of the bladder can be obtained, and the urologist is at a loss as to the size and location of the mass and the presence of any other pathological factors. In cases of marked hypertrophy of the prostate with cystitis and bleeding, clear vision is difficult, and conditions such as diverticula or stones may be easily overlooked.

To avoid all these difficulties we have used the following technique and have obtained the most gratifying results. We selected a mineral oil which is clear and transparent. The cloudy non-opaque oils should be avoided. This oil is then sterilized and warmed to body temperature and, though it becomes cloudy in the process, it will clear if allowed to stand for about thirty-six hours. The cystoscope is passed and the bladder irrigated with boric acid solution until a moderately clear return is obtained. The bladder is then drained through the cystoscope as completely as possible. From 150-250 c.c. of the oil are heated to body temperature and injected through the cystoscope into the bladder.

Since water, pus, and blood will not mix with the oil, the medium does not become contaminated with foreign substances or fluids. The dispersion of light through the oil gives a brighter appearance to the surrounding tissue, and the reflection of the light from the bladder is improved. The lens does not become covered with débris from the bladder.

Any bleeding is seen as a fine stream of bloody fluid which lies beneath the oil, the point of origin of which can be easily located. The pressure of the oil has a hemostatic tendency and seems to decrease and even stop the bleeding. The pus and débris, in some cases almost impossible to irrigate out completely, lie against the bladder wall, do not interfere with the vision, and can be easily seen. Any irregularity or deformity of the bladder wall is readily discovered. The ulcerations and the ureteral orifices in a tuberculous bladder, which in many cases could not be seen, can be localized. In advanced tuberculous bladders with secondary cystitis, the view obtained through the oil medium has given us a new conception of the cystoscopic appearance.

Operative procedures through the cystoscope in the bladder can be carried out advantageous-

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ly. The following points are in favor of fulgurations done in this manner:

1. A clear view is obtained of the tumor throughout the procedure.
2. If there is some bleeding, there is no necessity of interrupting the fulguration to irrigate the bladder, since the blood will settle below the oil and not interfere with the vision.
3. The hemostatic tendency of the oil is especially noticed here.

This technique is useful also in litholapaxies, biopsies, removal of foreign bodies, cutting of the ureteral orifices, median bar punch, and other such procedures. It has been suggested, moreover, that better pictures can be obtained in cystoscopic photography through the oil medium.

Since the oil does not mix with the pus and débris of the bladder, in pyelography of patients with bad infection, the chances of carrying infected materials up into the kidneys from the cystoscopic medium by the catheters is greatly decreased. Many authorities in the literature point out the fact that the urine specimen from the kidney may be contaminated by the passage of the catheter through the infected bladder, or the good kidney infected by passing the catheter through the infected bladder urine. This is especially important in tuberculosis, where specimens are being obtained for guinea pig injections.

After the completion of cystoscopy, other advantages are noted. The oil exercises a soothing effect on the bladder; patients void with less difficulty and do not complain of burning. This is especially noticeable in tuberculous cases.

SUMMARY

The following are the advantages of oil as a cystoscopic medium:

1. Clear vision in cystoscopy of a bleeding bladder.
2. Simplification of manipulation in operative procedures and catheterization cystoscopically.
3. The hemostatic tendency of oil.
4. The soothing effect on the bladder after cystoscopy.
5. It is an added factor in the prevention of contamination of the ureteral catheters and also infection of the normal kidney.

THE LANKENAU HOSPITAL RESEARCH INSTITUTE*

The problem which the Institute set itself to solve was: "What is the naturally occurring chemical mechanism regulative of growth by increase in cell number?"

In the answer to this question lies the understanding of the eventual means of controlling growth by multiplication of living things. In it rests the basis of stemming the scourge of malignant growth in man.

Using root-tips growing in culture solutions and a lead salt as reagent, it was found that a compound is precipitated in the region of active cell division, and growth by increase in cell number was stopped. Analysis of the precipitate under the microscope and on extraction showed it to be a combination of the metal with the sulphydryl group. Analysis of the root-tips showed that this group is naturally present in high concentration in the region of most active growth by cell proliferation. This holds in other biological material also. When it is removed by lead, cell division growth stops. The hypothesis was then set up that sulphydryl is the naturally occurring chemical group essential for cell division. It was found without exception that cell proliferation is accelerated by sulphydryl. Growth of corn and beans, healing of wounds in rats and man, growth of transplantable tumors is uniformly stimulated. The conclusion is that sulphydryl is the naturally occurring chemical group essential for growth by increase in cell number. Application of this principle to the healing of wounds, bed sores and ulcers of long standing is now being put to practical everyday use in numerous clinics, the sulphydryl-containing chemical used being thio-cresol, and the technique of its use having been developed and first used in the Lankenau Hospital.

In further investigations it was found possible not only to stimulate cell proliferation at will in these simple organisms by the use of sulphydryl, but also to retard cell proliferation with the sub-oxidized derivatives. We now have in our hands for the first time an exact identifiable chemical tool to be used in the exploration of further territory of unlimited significance to man, *i.e.*, growth by multiplication.

Since it has been definitely shown that sulphydryl stimulates cell division in a large number of plants and animals, including man, it is a reasonable assumption that the derived groups which have been proved inhibitory in plants and lower animals will, when tried, also operate in higher animals and man in the direction opposite to sulphydryl. It is clear therefore that these chemical types should be studied for their use on higher animals, including man. They must first be made, however, since they cannot be purchased in a form possible to administer to higher animals.

Two broad lines of expansion for this investigation are indicated as based on the establishment of this fundamental chemical principle. The one is of theoretical interest and is concerned with further study of the rôle of the sulphydryl equilibrium in histogenesis, differentiation and organization. Coupled with this are the problems of heredity and the chemical alteration of chromosome sensitivity.

The other is of direct practical value and aims to apply the principle to the treatment of malignant growths. Of immediate need is the development of a soluble, non-toxic, suboxidized sulphydryl derivative. The problem therefore is to synthesize a chemical substance which complies with these qualities. To these ends, the work of the Lankenau Hospital Research Institute will be continued.—*Bulletin of the American Society for the Control of Cancer.*

*From the February, 1931, report of the Lankenau Hospital Research Institute.

MEDICAL HISTORY

EDWARD WYER'S "OBSERVATIONS ON THE LYMPHATIC DISTENTION OF THE LOWER EXTREMITIES OF WOMEN WHILE IN THE PUERPERAL STATE"

BY WM. PEARCE COUES, M.D.*

THESE unusual, and apparently unique observations for the times, are of particular interest at present on account of the 150th anniversary of the Massachusetts Medical Society.

Dr. Edward Wyer was an Honorary Member of the Society, a practitioner of Cambridge, Mass. His communication appeared in the first volume of medical communications of the Society, printed in 1804.

Dr. Wyer[1] describes five cases of phlegmasia alba dolens ("Out of 989 I delivered while in business"); the first four cases reported were of moderate degree, though swelling and lameness of the affected leg lasted for nearly three months. External and internal remedies seemed to be of little avail, and as we would now expect, the cases followed their own course uninfluenced by treatment. The fifth case is of particular interest, it was much more severe than the others, complete disability lasting for over three months, the illness starting ten days postpartum. There was at first a sense of heaviness and weariness in the affected leg and thigh which was also felt in the perineum. In eight hours the pain extended up the inside of the pubis and thence to the inguinal glands. The inguinal glands became much swollen and were very tender to pressure. "From these glands the pain in 24 hours extended down through the thigh, in the course of the principal lymphatics, to the knee, from the knee it still was confined to the lymphatics, and through them passed so rapidly to the toes as to have disabled the whole leg in 36 hours." There was marked constitutional reaction at the same time; there was no change of color in the leg at this time, but there was much tenderness and stiffness and the whole lower extremity was entirely useless. Soon, Dr. Wyer tells us, swelling of the limb began, first noticed in the thigh, and the third day after its beginning, the extremity was three times its natural size. "The limb had a tense, smooth feel, did not retain the impression of the finger, was a little hotter than the other, but had the most remarkable glossy whiteness I have ever before seen in any living subject. On the side of the tibialis anticus muscle, I could discover a slight blush of red, as if a straw dipped in raspberry juice had been drawn to the knee, from the top of the foot, this stripe was remarkably painful to the touch, particularly just below the middle of the muscle, where is seated a large lymphatic gland."

After some 34 days we are told, the swelling began to subside, first in the thigh, then by degrees down to the foot. In 97 days from the beginning of the attack the patient was able to raise the limb from the bed, but could not support the weight of the body on it. On the patient's attempting to walk a quarter of a mile, swelling and tenderness again appeared. "And the red stripe upon the anterior surface of the leg began to appear and great were her apprehensions of the return of the disease." These symptoms gradually disappeared.

Dr. Wyer's conclusions were as follows, "But that this disease depends upon an accumulation of lymph in the limb and that this accumulation is dependent on causes peculiarly connected with the puerperal state,—I think may be proved by the most incontestable arguments."

Recently in this *Journal*, John Homans[2], in remarks on "The Operative Treatment of Phlegmasia Alba Dolens," tells us that, "In pre-Pasteurian days, the common thromboses of the puerperal state chiefly were studied. At the beginning of the 19th century, it was thought that inflammation of the vein wall caused clotting of the blood within it. . . . Under Virchow's influence the idea of primary phlebitis was dropped. The blood was the chief consideration, and changes in the venous walls were secondary."

In light of the theories obtaining at the time of Wyer's communication, his acute observation and accurate description of a lymphangitis, his theory of the causation of phlegmasia, must be of great interest to all those who study the etiology of this obscure condition, and its relation to the lymph glands and channels of the pelvis and lower extremities.

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*Coues—Surgeon to Out-Patients, Massachusetts General Hospital. For record and address of author see "This Week's Issue", page 1380.

Editor *New England Journal of Medicine*,

Regarding the communication just sent you, "Observations on the Lymphatic Distention of the Lower Extremities of Women while in the Puerperal State" by Edward Wyer, I find that his name is listed in the old records of the Massachusetts Medical Society as of Halifax, Nova Scotia and Cambridge, Mass. In one of the volumes containing this article, the name is listed as of Halifax, Nova Scotia, this occurring after the title of his article. The list of Fellows published in May, 1813, gives Edward Wyer, Honorary Member, Cambridge, Mass., deceased. The observations quoted above must have been made in Halifax, Dr. Wyer making his residence in Cambridge some time afterwards.

Yours truly,

WILLIAM PEARCE COUES.

May 26, 1931.

HAZARDS AND HOPES IN THE EDUCATION OF TRAINED NURSES*

BY ROBERT BAYLEY OSGOOD, M.D.†

FIRST let me thank you and Miss Goostray for asking me to deliver your graduating address. It is pleasant and easy to say God-speed to you as you are about to leave the shelter of what I have grown to believe is one of the happiest, most efficient and most complete Children's Hospitals in the world. The spirit which pervades it is unique and is due to the wisdom and humanity of the Board of Managers, the loving kindness and resourcefulness of its Superintendent, the devotion and ability of its Medical Staff, and the vision and fairmindedness of the Head of the School of Nursing.

It is easy, as I have said, to say God-speed to you, but it is not easy to accept the responsibility of trying to give you things to think about which may be helpful as you go out into the world of personal effort. I think you will agree that it would be rather futile for me at this stage of your career to try to tell you in half an hour what you should do, if after three years of teaching you have not already learned what you ought to do and when and how you ought to do it. It is just possible that a not too young doctor's thoughts concerning the trend of nurses' training may provoke thoughts and perhaps stimulate discussion among yourselves which will not be futile.

I quite realize the fact that the doctor is a queer animal, often obtuse, more often obstinate and most often in his own estimation omnipotent. Nevertheless, my observation is, that generally speaking he is not an altogether bad fellow and at his worst means little more in his frequent criticisms of nurses than that "All the world is a little queer but thee and me, and thee art a little queer." Moreover, as the game is at present played (and I see no indication of an immediate change in rules), the nurse is a little more dependent upon the doctor than the doctor upon the nurse. Whatever changes are to be made in the rules, it is certain that if the game is to be played well, the nurses and doctors must pull together. There must be common understanding, common purpose and common endeavor.

If we are to appreciate the present situation, we shall do well to glance at the background of organized nursing of the sick. The present nursing situation needs to be seen in perspective, quite as much as any painting except perhaps a painting of still life. Alas, we are not dealing with still life but with a tense, throbbing life in which the cruel law of the survival of the fittest still holds.

The Roman patrician, Fabriola, 1600 years ago, founded a hospital and devoted herself to nursing the sick. Only a few years later we are told that 600 women were engaged in nursing in the hospitals of Alexandria, working under the religious orders. The order of St. Vincent de Paul, founded in 1638, remains, I believe, the largest nursing organization in the world. A hundred years earlier, King Henry the Eighth appointed a nursing staff of twelve women at St. Bartholomew's Hospital in London. They were hardly more than waiters on the sick, recruited from the lower classes and their service seems to have been looked upon as degrading.

No serious attempts were made to really train, much less to educate nurses until about a hundred years ago when Pastor Fliedner, in 1836, established at Kaiserwerth in Germany an institute for the training of deaconesses. Here "The Lady of the Lamp" received her nursing education. Two years later the Society of "Friends" founded a nursing organization in Philadelphia, and two years later still another semireligious school was started by Quakeress Fry in London. The British nurses are still called "Sisters" because of their religious background. The first hospital training school was opened (also in London) at St. Thomas Hospital in 1860, and the first district nurse was employed in Liverpool in 1865. The same training system was adopted by three American hospitals in New York, New Haven and Boston in 1873. The doctor eventually welcomed, if he was not responsible for, the advent of the trained nurse. Miss Linda Richards, America's first trained nurse, died only about a year ago. She was graduated from the New England Hospital for Women and Children in 1873. It has been said that Miss Richards in three years changed the attitude of the staff of the Massachusetts General Hospital from "put out the school, the old way is the best," to one in which they referred to "our school" with pride.

The fight of trained nurses for mere existence was not long, but the fight for the right of a trained nurse to be so educated that when her training was finished she would be recognized as belonging to the professional class quite as much as a physician, a lawyer or an architect, has been a long one and is perhaps not quite over yet. It is so nearly over that there can be no doubt concerning the outcome. At certain stages of the carefully planned campaign which

*Address to the Graduating Class of the Boston Children's Hospital School of Nursing, May 27, 1931.

†Osgood—Professor of Orthopaedic Surgery, Harvard Medical School. For record and address of author see "This Week's Issue", page 1380.

her farseeing generals laid out, it is probable that the doctors might have longer delayed her inevitable victory. Be that as it may, she has arrived largely by her own efforts, and the comparatively young nursing profession is now captain of its own fate, must watch, but take, its own steps, adjusting itself as best it can to the rather rapid changes that are taking place in the art of healing, the education of women and the trend of public opinion. At all events, the responsibility for necessary adjustments is clearly in the hands of the nursing profession.

The hospital training school system is 70 years old and is going strongly still, perhaps dangerously strongly, considering its advanced age and the trend of the times in the education of women in the professions. It began, and in many instances has continued, as an apprentice system which has much to commend it if the things to be learned are single or simple. If there is time enough allowed, it may be a good system for learning complicated and varied things. It is not, however, economical of time, for every apprentice is obliged to do many things beside those which have a direct bearing on his or her education. The apprentice system is a thorough, though slow system. But the pace has been made as fast in education as in the rest of life, too fast perhaps but compellingly competitive. As Professor Winslow has said: "Today the nurse is the only kind of (professional) person in the world who is expected systematically to pay for her education, with the work of her hands, at the time she is getting the education." The hospital training school system developed primarily out of the need of the charity hospitals to care for the sick economically and in some measure adequately. It has worked well for many years and most people having to do with it think it is working well now. After we have outlined the present situation and opportunities of trained nurses, we shall be bold enough to discuss this almost universal system a little more. For the moment, I would remind you that it was a response to what seemed to be hospital necessity. But the training of nurses did not begin in hospitals but in special institutions planned for their special education. A clock has a normal small swing of its pendulum both forward and backward, but if the pendulum swings too far either way, the clock will not keep good time. It may stop and then its hands must be reset. We are endeavoring to find out whether or not the nursing clock is keeping good time and whether its pendulum needs regulating.

PRESENT SITUATION

This graduating class and recent graduates are familiar, through their courses in organization, with what I believe you call "The Red Book," entitled, "Nurses, Patients and Pocketbooks." It surely is a *red* book, but *constructively* red rather than *destructively* red.

In this study of the nursing situation by May Ayers Burgess, Ph.D., undertaken and supervised by the Committee on the Grading of Nursing Schools, of which Dr. William Darrach of New York is chairman and with whom Miss Goostray has been intimately working, certain striking facts have been brought out concerning the present situation in which trained nurses find themselves. The graduating class, for the sake of your friends in the audience, will forgive me if I mention a few of these facts already known to you.

The nursing profession as a whole is becoming overcrowded, contrary to the general impression that there is an *under* rather than an *over* supply of trained nurses. This over supply is found among the group known as the private duty nurses, that is, the nurses who practice their profession and earn their livelihood by nursing the sick in homes which can pay for them, and as special nurses in hospitals. This group comprises more than one-half of the profession of the trained nurse.

We hear much today as to the cost of medical care. We *ought* to hear much of it and adjustments must be made, but neither the doctors nor the nurses nor the hospitals are growing rich at the expense of the sick public. The annual expenditure of the average American family is many times higher for automobiles and radios, tobacco and confectionery, even I believe, for cosmetics, perfume, paint and powder, than it is for medical care, and the average yearly earnings of private duty nurses are below $1400, which with the present cost of living is considered to be the minimum income on which an independent self-respecting woman working under hygienic conditions can support herself.

The Committee on the Grading of Nursing Schools asked many thousands of nurses engaged in practice whether they desired to remain in the profession of nursing. Forty-five per cent., nearly one-half of the private duty nurses, responded that they did not. More than half of the nursing profession are private duty nurses, nearly half of these women are dissatisfied with their careers as a means of livelihood. This dissatisfaction may not be unhealthy, but it is giving the leaders of the profession food for thought. I believe these leaders are thinking hard and very "straight" and that the methods of relieving this rather distressing situation are clear to most of them.

It is evident that as the nursing profession may now be roughly divided into private duty nurses, public health nurses and institutional nurses, the private duty class is overcrowded. It is *by* this class that most dissatisfaction with their work is felt. It is also *with* this class that most dissatisfaction is felt

by the public and by physicians. I can do no better than to quote some of the conclusions reached by the Sub-Committee on Nursing of the recent White House Conference on Child Health as to the reason for dissatisfaction. Your director, Miss Goostray, was chairman and spokeswoman for this committee. "The exploitation of student nurses for cheap labor in hospitals which are in no position to offer even reasonably adequate theoretical or practical instruction is the underlying cause of poor nursing service in all branches." The fundamental causes of dissatisfaction with private duty nurses on the part of official registries and on the part of physicians . . . can be traced back to deficiencies of personal qualifications and general education of young women entering schools of nursing. The faults are inherent in the present system of nursing education where exploitation of student nurses for cheap labor for hospitals is possible and prevalent.

The medical profession has been faced by similar difficulties. Fifty years ago there were 100 medical schools in the United States. Thirty years ago there were 160. Today there are about 80, one-half the number that there were in 1900. Contrast the figures of nursing schools. Fifty years ago there were 15, 30 years ago there were 432; today there are over 2,000. More than 100 times as many as there were fifty years ago and five times as many as there were in 1900. The doctors controlled their excessive output by raising the standards of medical education, by grading schools of medicine and by forcing all the poor medical schools to close their doors. It may well be that the nurses will be wise if they adopt a similar plan.

The training school of a great hospital in which the highest standards of nursing education are satisfied, is no longer an undoubted economy to the hospital. To determine whether it is an economy, needs, according to Professor Winslow, a more careful hospital cost accounting than most hospitals can furnish today. It has become important to separate the cost of caring for the sick from the cost of educating the nurse. According to the 1930 Report of the Massachusetts General Hospital just issued, the hospital will need in the near future to house 614 nurses, which number may nearly equal the total number of beds in the General Hospital, the Phillips House and the Baker Memorial. In the recent successful drive of the Boston Children's Hospital for a million and a quarter dollars to make it possible for the hospital to care adequately for all types of sick children, it was necessary in order to satisfy this hospital's high standards of nursing education to spend nearly half of this sum in building and equipping a home for nurses, containing almost as many beds as there are beds for sick children. These figures should make us thoughtful. As Miss Johnson says, in the last report of the Principal of the Massachusetts General Hospital Training School for Nurses, "Every year finds it more difficult to provide a teaching program which will adequately prepare the graduates of the school to meet the increasing demands made upon nurses by the developments in medicine and by the community which is yearly becoming more health conscious. The policy of employment of graduate nurses in the Phillips House and the Baker Memorial is a liberal one. In the near future it will be necessary to consider the extension of this policy to the General Hospital because the student nurses cannot give the entire nursing care to the four hundred patients in the General Hospital and at the same time carry a class room program which compares favorably with the class room program of other schools of high standards." It is to be remarked that there is at present in the training school of this hospital one nurse to every 1½ patients. It may be pertinent to ask the question, will it long be economical for the hospital and fair to the nurses and the public for the hospitals to accept the responsibility for the education of the trained nurse? In this connection it is interesting to read one of the carefully considered recommendations of the Committee on Nursing of the White House Conference from whose report we have previously quoted. "No hospital should be expected to bear the cost of nursing education out of funds collected for the care of the sick. The education of nurses is as much a public responsibility as is the education of physicians, public school teachers, librarians, ministers, lawyers and other students planning to engage in professional public service, and the cost of such education should come not out of the hospital budget, but from private and public funds."

Miss Roberts, editor of the *American Journal of Nursing*, has said, "The real weakness of the schools of nursing is due to the fact that they are proprietary schools. With few exceptions they are owned by the hospital. They have the disadvantages of institutions which exist not for the primary purpose of education, etc."

So perhaps there is a hand now writing on the wall in relation to the education of trained nurses, but it has not written clearly yet. The almost ideal hospital training school, such as I believe this school of yours (and ours) is, offers so nearly the ideal training and education for the nursing of children, that we must be sure that any change of ownership or direction will be a forward rather than a backward step. It might be, however, a normal swing of the pendulum of the nurses' clock toward the original idea of the education and training of nurses. Experiments in the education of nurses in independent schools are being tried and will be watched with acute interest.

OPPORTUNITY

Perhaps from what I have thought it best to say thus far, you have been led to suppose that I am a pessimist as to trained nursing. I am quite the reverse. I am a violent optimist. I have spoken thus, only because I have long been convinced in discussing medical questions before audiences of medical men, that it is most profitable to stress the difficulties of a situation and frankly present its weaknesses. A striking characteristic of the late Dr. Maurice Richardson, Professor of Surgery at Harvard and the leader of his profession in his time, was his fearless custom of reporting his failures rather than his successes. The brilliance of his successes was well known and this made his difficulties the more helpful. The profession of trained nursing may be said to have had no serious failures. It has marched straight on, has surmounted great difficulties and will overcome the few that remain. It holds an absolutely essential portion of the field of medicine, and I believe the extent of its area will continue to enlarge.

Even the overcrowded group of private duty unspecialized nurses might be more satisfied and more constantly employed if they would not flock to the densely populated cities. There are still many communities in the United States where the people are crying for more general practitioners of the nursing profession. The various counties of New York, California and Louisiana have been surveyed in respect of the distribution of nurses. In the whole population of the United States, there is one active graduate nurse to every 600 people. In New York City there is one to every 230 people, while in Schoharie County, a few hours away, there is only one to 5,000 people. In seven of the more densely populated counties of California, there is at least one nurse to every 500 people, and in 29 counties only one to more than 1,000 people. In Shreveport, Louisiana, there is one state registered graduate nurse to every 171 white persons, but there are 57 counties in which there is only one nurse to more than 1,000 white people. And so the instances of uneven distribution might be multiplied. The private duty nurses in many localities have until recently lacked leadership and organization. If they have this, even the present seeming over-supply may be absorbed, if nurses are willing to till more thoroughly the fascinating though hard field of rural nursing, where the rewards of service are very great.

Fifty years ago the American Medical Association appointed a committee to study and offer suggestions as to the control of the rapid increase of specialization in medicine. The livelihood of the general practitioner seemed to be threatened by the specialists. The majority report of this committee proposed radical and perhaps efficient methods to curb specialization. It was a professor of Physiology of the Harvard Medical School, Henry Pickering Bowditch, a member of the committee, who presented a minority report so sane and convincing that no action adverse to specialization in medicine was taken by the Association. He made it evident that specialization was necessary to medical progress and to the acquisition of new knowledge by the profession. Specialization is obviously necessary in the profession of trained nursing. There have already emerged specialized groups of nurses; we refer to the groups of nurses designated as public health nurses, and institutional nurses, and the private duty groups requiring special training to care adequately for mental, heart, contagious, obstetric and pediatric cases. Instead of there being an oversupply of these specially trained nurses, there is an under-supply and the material rewards in the way of financial return are greater. Institutional nurses trained for executive and supervisory positions in hospitals may look forward to steady work and an average eventual salary much higher than that of the average general private duty nurse. Nearly the same is true of nurses specializing in public health work. I should suppose that even more financial return and perhaps more independence may be expected by an outstanding private duty nurse who elects to specialize in neurology, obstetrics or pediatrics.

So you see the present situation is far from discouraging and needs chiefly adjustments to meet the eternal changes which every profession must expect if it is to keep in step with the times and accept the responsibility of progress. I believe no class has ever been graduated from the Boston Children's Hospital with a wider or more hopeful opportunity for service and happiness than this present class. Your apprenticeship, though it may have been a long one and cost the hospital a good deal of money, has given you a nicety of training and a breadth of education in pediatric nursing probably superior to that of any other hospital trained group in the country.

If you succeed in escaping the hazards of matrimony, you will find this and other communities ready to welcome you into a service than which there is none more useful or happy, and I think I may say, more healthy for body or mind. Moreover, with your special training it should be a comparatively wealthy service. To be an ideal service, the only thing that it requires besides health and wealth is wisdom. Wisdom to think things through for yourselves. You have the knowledge, but as Cowper says,

"Knowledge and wisdom, far from being one,
Have oft times no connection. Knowledge dwells
In heads replete with thoughts of other men;
Wisdom in minds attentive to their own.

. . . . . .

Knowledge is proud that he has learned so much;
Wisdom is humble that he knows no more."

You are members of the nursing profession. The profession of medicine looks upon you as co-laborers for a common cause, the relief of distress and the healing of disease.

In the legal profession, which is often compared to medicine, the senior member of a law office depends upon the briefs of his junior partners in working up his case. The head of the firm may appear in court only occasionally, but his co-partners are always present, watching every move of the enemy. The partnership of effort and of purpose is complete. Disaster is almost certain unless there exists absolute understanding between the partners. In medicine, the doctors and the nurses are partners. The nurse's service to the patient is often more important than that of the doctor, but a framework of military discipline must be maintained. The physician must be the captain of the patient's fate and accept the ultimate responsibility. The cage of a clergyman's parrot was once placed in close proximity to that of the parrot of a sailor. The clergyman's parrot said, "What shall we do to be saved?" The sailor's parrot replied, "Pump like the devil, or we will all go down,"—an excellent reply, but let us pump in rhythm and all together, rather than jerkily and individually. We shall be less likely to break the pumps and more likely to save the ship.

I congratulate you upon the completion of your course and I congratulate the profession of nursing upon numbering you among its members. I bid you God-speed and Bon Voyage and I forecast for you good weather and safe seas, with perhaps a few white caps, but with the tang of a steady breeze to keep your minds clear and carry the ship of nursing always forward towards its destination.

NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL

In accordance with the agreement between the New York Post-Graduate Medical School and Hospital and Columbia University, effective July 1, by which the former becomes the Post-Graduate School of Medicine of Columbia, an Administrative Board of Post-Graduate Studies in Medicine has been established by President Nicholas Murray Butler, on which will be represented members of the governing body of the University, the undergraduate medical school and the postgraduate school of medicine.

Under the terms of the affiliation, this Board will have general oversight and control of all postgraduate instruction in medicine offered by the University, whether at the Medical Center, the Post-Graduate Medical School or elsewhere in the city, and is constituted as follows: Dean Willard C. Rappleye, Chairman, Dr. Linsly R. Williams, Dean Howard Lee McBain, Director James C. Egbert, Dr. Walter W. Palmer, Dr. James W. Jobling, Dr. Frederick Tilney, Dr. Arthur F. Chace, Dr. Herman O. Mosenthal, Dr. Howard F. Shattuck, Dr. Edward H. Hume, Dr. Harry S. Dunning, Dr. Lewis F. Frissell, and Mr. Frank D. Fackenthal.

On nomination of President Butler, the Trustees of the University have appointed Dr. Edward H. Hume, as Director, and Dr. Alan R. Anderson, as Associate Director of the New York Post-Graduate Medical School.

This incorporation of the New York Post-Graduate Medical School into the teaching system of Columbia University as its postgraduate school of medicine, distinct from the undergraduate school, carries into fruition, after some forty-nine years, the ambition of the seven founders of the Post-Graduate who resigned from the Faculty of the New York University upon the refusal of the Trustees to grant them a separate building for postgraduate instruction and, early in the year 1882, organized the present New York Post-Graduate Medical School and Hospital.

For additional information please refer to Dept. of Public Relations, Gramercy 7080, Ext. 177.

CANCER DIAGNOSTIC CLINICS

At the present time there are 40 cancer diagnostic clinics in the United States. The majority of these are located in Massachusetts and in metropolitan New York. Thirteen others are being proposed for two southern states.

Theoretically, the organizing of cancer diagnostic clinics appears to be a step in the right direction. However, sufficient experience with this type of work has not yet been accumulated to permit of its evaluation.

We must keep in mind that the resources available for the diagnosis and treatment of cancer differ widely in states predominantly rural from those available in the metropolitan areas of large cities.

The medical groups in the rural areas are unwilling to recognize as authorities in cancer diagnosis and treatment those physicians who have merely signified their desire to become specialists without the special experience necessary for such leadership. As a result, it is impossible to organize a diagnostic clinic with even a small degree of permanency. Even if it were possible to organize a cancer group with superior knowledge and training, without the active support of the medical profession and the necessary equipment, it would be no more useful than a highly efficient city fire company in the Mojave Desert.

The personnel of cancer diagnostic clinics needs the moral, mental and physical support which can be secured only by a close affiliation with a highly organized and efficiently equipped cancer therapeutic clinic. In a few instances, unaffiliated diagnostic clinics have had a modicum of success, but the eventual mortality is too high for this type to be considered as a potent factor in the solution of the rural cancer problem.

On the other hand, cancer diagnostic clinics affiliated with mother diagnostic and therapeutic clinics or hospitals might be conducted with a high degree of success to all parties concerned, not the least of whom is the family physician.—*Bulletin of the American Society for the Control of Cancer.*

CASE RECORDS
of the
MASSACHUSETTS GENERAL HOSPITAL
ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICAL-PATHOLOGIC EXERCISES

EDITED BY RICHARD C. CABOT, M.D.
F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 17261

ACUTE FEVER, DIARRHEA AND DELIRIUM

MEDICAL DEPARTMENT

A Cape Verde Negro thirty years old entered through the Emergency Ward February 25 in delirium.

He was quite well until twenty-eight days before admission. Then he and two other members of his family had what was thought to be influenza,—high fever of rather sudden onset and malaise. He stayed in bed until seven days before admission, when his fever was negligible. He was up and about for four days. Then he was much worse, with high fever and malaise, and was confined to bed again. For the two days immediately before admission he was very much worse, with vomiting and frequent loose movements. The day before admission edema of the extremities was noted. That night he became delirious. The day of admission he was still worse.

The past history was essentially negative.

Clinical examination showed a prostrated young Negro, staring and delirious, lying with his neck stiff, his legs straight and his back slightly arched. His lips were parched. He breathed easily and quietly, without cough. The nail beds were cyanotic and pale. The skin was very dry, otherwise not abnormal. One sclera showed a superficial granulated ulcer. The throat and tongue were parched and dry. There was a slight greenish exudate on the tonsils. The neck was stiff and painful on flexion. The chest expansion was limited but equal. The left chest protruded slightly. There were occasional crepitant râles at both bases. The left back showed dullness with diminished breath sounds, vocal resonance and tactile fremitus below the fifth rib. The heart was greatly enlarged to the left. The apex impulse was in the fifth interspace 12 centimeters to the left of midsternum, coinciding with the left border of dullness 4 centimeters outside the midclavicular line. There was no enlargement to percussion. The action was rapid, the rhythm regular. The sounds were of poor quality, with a to and fro murmur. A loud, high-pitched superficial coarse friction rub was felt over the entire precordium, felt best over the third left interspace and heard loudest over the second and third left interspaces. At the axilla only a to and fro blowing murmur was heard. The pulses were flapping and of Corrigan quality. The artery walls were normal. The blood pressure was 80/30. The abdomen was negative. There was pitting edema of the hands and feet. There was marked Kernig, the least flexion of the thighs causing the patient to cry out in pain. The knee jerks and ankle jerks were increased. On the first stimulation of the left plantar there was extension of the great toe.

The leukocyte count in the Emergency Ward was 22,000.

The temperature was 104.8° to 104.4°, the pulse 130, the respirations 40 to 26.

A Hinton test was negative. Blood cultures in three flasks showed no growth. The nonprotein nitrogen was 70.

A lumbar puncture the evening of admission gave clear colorless fluid with no clot, initial pressure 240, prompt rise and fall on jugular compression, 8 cells, ammonium sulphate positive, alcohol and Wassermann negative, total protein 31, colloidal gold 1122232100. A culture of the spinal fluid showed no growth in six flasks.

The patient stood the lumbar puncture well, but after a few hours died.

CLINICAL DISCUSSION

BY RICHARD C. CABOT, M.D.

NOTES ON THE HISTORY

From that history I cannot make any intelligent guesses as to what the physical examination is going to show. He seems to have had an infection, but I have no idea what. He seems to have had some edema, but what the cause of it is I do not know. In two-thirds or three-quarters of our cases we can make an intelligent guess from the history alone, but the other quarter is like this, in which without a physical examination we should be entirely at sea.

NOTES ON THE PHYSICAL EXAMINATION

As far as I know the superficial granulating ulcer on one sclera might be due to unconsciousness or delirium, the eyes being open and not properly cared for.

Of course when lung signs like these are found at the left base they are much more significant than when they are at the right. At the right they may be due to the liver or to a high diaphragm. With such signs at the left there is more likely to be something in the pleura, especially fluid.

There was no enlargement to percussion, presumably because the lungs were distended and overlying the heart.

It is important to know where that to and fro murmur was.

"Felt" is an important word when used in connection with a friction rub.

The pulses were Corrigan, tending to prove that a murmur which otherwise sounded like a pericardial one was not entirely pericardial.

I do not think I ever knew anyone's measuring a blood pressure of 30 before.

DIFFERENTIAL DIAGNOSIS

There certainly are two things the matter with this man. I do not see how we can cover it all in one diagnosis. Perhaps there are three things. He certainly has a heart lesion with aortic regurgitation, which in a Negro makes us suspicious of syphilitic aortitis. Also there is reason to suspect pericarditis, though as you know we go wrong so often on the well known physical signs that I no longer say more than "I suppose". We have here the best signs one could ask for of plastic pericarditis. Neither of those things, so far as I know, could give him a stiff neck or an arched back or the condition of the legs that is described. Those things are caused by meningitis, or "meningismus", the same thing in a lesser degree. I do not see how we can get away from saying there is something in the brain, presumably meningitis or something so much like it that it is not essentially different. Of course the spinal fluid gives a disappointing result. We ought to get some cells; we ought to get some organisms. If it were tuberculous meningitis we should not get the organism, but we ought to get more lymphocytes. I still think he has got essentially meningitis.

What else could he have? Of course a cerebral abscess might give signs something like that. But there is no indication as to where it could come from. It comes from the lung ordinarily or from the ear. Cerebral tumor and cerebral hemorrhage ought not to give such signs. Syphilis can. The rest of the symptomatology shows that it was not merely a heart case, though it might all be due to an infection hitting the brain and causing acute pericarditis. I do not think acute pericarditis could possibly give him these central nervous system symptoms.

I think we ought to say that he has aortic regurgitation with hypertrophy and dilatation of the heart, which in spite of the negative serology we suppose to be syphilitic; very possibly acute pericarditis; possibly fluid in the left chest. I should say he ought to have a meningitis in spite of the negative spinal fluid.

A STUDENT: Would you consider a subacute bacterial endocarditis?

DR. CABOT: Yes, I think one ought to. Of course the negative cultures do not prove anything. But there are no evidences of embolism unless the meningeal symptoms are taken to be such. It does not sound to me like an embolic lesion. That is characterized by sudden onset with paralysis, whereas this was a gradual onset without paralysis.

A STUDENT: In view of the non-protein nitrogen do you think one would have to consider uremia?

DR. CABOT: I think not. We have had several cases with a non-protein nitrogen in that vicinity and nothing to account for it postmortem.

A STUDENT: In view of the fact that he may have had influenza and now has brain trouble, do you think of epidemic encephalitis?

DR. CABOT: It might be considered. But he ought not to have such a stiff neck. Any case of encephalitis ought to have more cells in the fluid, but a fluid like this is compatible with encephalitis. His psychical state is not characteristic. The same is true of his motor state. Many of these cases have a history of choreiform movements and of diplopia or other trouble with the cranial nerves in the beginning. It is interesting that he did seem to have one infection in the beginning and get through with it, then another, and so on.

A STUDENT: In view of the fact that two other members of his family were sick at the same time, is there anything suggestive of meningitis due to an organism causing intestinal disease, say the colon bacillus?

DR. CABOT: I do not know of a meningitis due to any intestinal organism. I doubt if it exists.

A STUDENT: What do you think is the etiology of meningitis?

DR. CABOT: I do not know. It is a very dubious diagnosis at best. What do you think he has in the brain?

A STUDENT: Is it tuberculosis?

DR. CABOT: But that ought to give him cells in the spinal fluid. He ought to have a great many lymphocytes.

A STUDENT: Is the history consistent with pneumonia followed by empyema?

DR. CABOT: Yes, but he has not enough empyema to kill him. We have to have something in the nervous system.

A STUDENT: Is it possible to have a secondary encephalitis following empyema?

DR. CABOT: Possibly.

A STUDENT: Is there a record of sugar in the spinal fluid anywhere?

MISS PAINTER: The sugar was not done.

A STUDENT: In cases of meningococcus meningitis doesn't one occasionally find a spinal fluid without many cells?

DR. CABOT: Yes, at the late stage when it becomes chronic, but not in the early stages.

A STUDENT: Is the history too long for paralysis?

DR. CABOT: I should say yes, it is too long.

A STUDENT: Is there any other condition besides brain infection in which you get Kernig and stiff neck?

DR. CABOT: We sometimes get them in uremia and alcoholism. They mentioned in the history pitting edema of the hands and feet. That

is not accounted for unless the heart may possibly account for it.

I am not satisfied with the diagnosis. I am pinning my hope on the heart and the aortic valve.

A STUDENT: Why do you think a brain abscess unlikely?

DR. CABOT: Because that usually gives focal symptoms and usually starts in either the lung or the ear. Usually too we have a great many cells in the spinal fluid.

A STUDENT: Might it possibly be typhoid fever? The rapid pulse and high leukocyte count are against it, I know.

DR. CABOT: Yes, and the loose stools are against it, too. We do not usually have that in typhoid fever.

A STUDENT: Are there any food poisons that act in this way?

DR. CABOT: I cannot identify this with any poison. Is there anything that he might have got under the name of alcohol? I cannot identify it if there is any.

A STUDENT: How about the low blood pressure?

DR. CABOT: That is the blood pressure of a man who is very sick. He is just going to die and it is low for that reason. The only disease in which such a low blood pressure helps us in diagnosis is Addison's. I do not see that we have anything to suggest Addison's here. It is a hard diagnosis to make in a Negro, anyway. It has to be made on the pigmentation of the mouth inside and on characteristic heart and gastric attacks.

CLINICAL DIAGNOSES (FROM HOSPITAL RECORD)

Acute bacterial endocarditis.
Pericarditis.
Aortic regurgitation.

DR. RICHARD C. CABOT'S DIAGNOSES

Heart disease, probably syphilitic aortitis, with aortic regurgitation.
Hypertrophy and dilatation.
Possibly pericarditis.
Possibly empyema, left.
Meningitis.

ANATOMIC DIAGNOSES

Rheumatic heart disease: chronic endocarditis of the aortic and mitral valves; aortic and mitral regurgitation, probably slight tricuspid regurgitation; acute endocarditis of the aortic, mitral and tricuspid valves.
Acute pericarditis.

PATHOLOGIC DISCUSSION

DR. TRACY B. MALLORY: I have a feeling that I am not going to satisfy you in this case. We found at autopsy an acute and chronic endocarditis and an acute pericarditis, but absolutely nothing else. His brain and meninges were normal. His heart showed chronic rheumatic lesions of the mitral and aortic valves and a superimposed acute endocarditis of the mitral, aortic and tricuspid valves. The vegetations were small, partially organized, rheumatic in type. The pericardium showed a fibrinous exudate on both surfaces and a seropurulent fluid. It looked like an infectious or rheumatic pericarditis and not the pericarditis we see in uremia. The blood cultures at autopsy were negative as in life.

DR. CABOT: Even from the pericardium?

DR. MALLORY: Yes.

A STUDENT: Were there any deforming lesions of the valves?

DR. MALLORY: The mitral and aortic valves showed a certain degree of regurgitation and there probably was a slight degree of tricuspid regurgitation. I do not believe it was very significant. There were acute lesions on all three valves.

A STUDENT: Were cultures made from the valves themselves?

DR. MALLORY: No.

A STUDENT: Do you think the disease might have been due to the gonococcus?

DR. MALLORY: I do not believe so. The older literature is full of references to cases of gonococcus endocarditis. About 1900 Thayer, for instance, reported a large series of gonorrheal cases. There have been extremely few around here. Most of the cases of "gonorrheal" endocarditis have turned out to be meningococcus endocarditis.

A STUDENT: Is that low blood pressure consistent with the Corrigan pulse?

DR. MALLORY: Yes, I should think so. Practically no diastolic pressure at all and a moderate systolic pressure, — I should think that might give a collapsing type of pulse.

A STUDENT: The kidneys?

DR. MALLORY: The kidneys are grossly normal. Microscopically they show the embolic type of glomerular lesion, that is marked changes in individual glomeruli but the majority negative. Such cases rarely show evidence of renal insufficiency.

A STUDENT: How about the fluid in the pleural cavity?

DR. MALLORY: There was a very small amount of fluid on each side and collapse of the lower lobes.

A STUDENT: How do you explain his meningeal symptoms?

DR. MALLORY: I have seen as marked symptims as that in meningismus and in pneumonia in children, entirely clearing up in a few days. It is not uncommon in children, though it is rare in adults.

A STUDENT: Was there no evidence of pneumonia at all?

DR. MALLORY: No.

DR. CABOT: This is the sort of case on which the term "meningismus" rests. We see a great deal of it in children and a certain amount of it in pneumonia of adults.

CASE 17262

THE USE OF SALYRGAN IN CONGESTIVE CARDIAC FAILURE

MEDICAL DEPARTMENT

PRESENTATION OF CASE

DR. EARLE M. CHAPMAN*: This is the story of a fifty-six year old lumberman who came in on February 20. His chief complaint was of breathlessness and cough of three years' duration.

His present illness dated to three years before admission, when he had sharp pain over the lower chest when lifting a piece of heavy lumber. This pain lasted about a week and he became short of breath. A few months after this he had another attack which forced him to stop his work and take a rest. There were no other cardiac symptoms at that time except that he required two pillows for sleep. After a month he was well and worked for two years, until February, one year ago, when he again was forced to stop work for a month because of severe shortness of breath. He returned to work and had little trouble until six months before entry, when he grew slowly worse and led a chair and bed existence. Two months before entry when his doctor attempted to digitalize him the dyspnea improved, but the cough persisted. Two weeks before admission his scrotum, penis and legs became markedly edematous. Ten days before entry his doctor made multiple punctures in the scrotum to try to drain it.

His family history is not remarkable except that his father died of heart disease at fifty-six and his mother, who is living, also has heart disease.

His marital history and past history are noncontributory except for one attack of catarrhal jaundice at twenty-five. His worst weight was 336 pounds, five years ago, his weight when he came in here 276 pounds.

He came into the ward with typical signs of marked congestive cardiac failure. The nonprotein nitrogen was slightly elevated. At entrance it was 34. He presented the picture of the end stages of hypertensive heart disease with congestive failure and auricular fibrillation. His scrotum and penis were markedly swollen and draining from the punctures. He was started on a course of digitalis and absolute rest in bed. On February 22 he was given one cubic centimeter of salyrgan. There was no increase in the urinary output. On February 24 we gave him a second dose of 2 cubic centimeters of salyrgan. This was followed by an increase in his urinary output to about 90 ounces. He felt much better and through this period definitely improved, the output daily exceeding 45 ounces until March 3. Some edema of his scrotum, penis and legs persisted however, the dorsal surface of the scrotum becoming necrotic and sloughing off. On the morning of March 2 he was given another 2 cubic centimeters of salyrgan because fluids were not moving fast enough in spite of the fact that on review it was seen that the output had dropped after the first dose and there was only a slight increase the second time. By afternoon the picture had entirely changed. The temperature went up and he complained of headache and malaise. His throat and chest were clear except for a few râles at the bases. The rest of the examination remained as before. He was obviously a very sick man. His urinary output dropped down to an immeasurable quantity. This we thought was the effect of the salyrgan. The next morning very scanty urine was obtained, loaded with red cells, white cells and casts and showing considerable albumin. We cut off fluids that first day, but followed that by trying to force him to take more fluid. His kidneys responded. The next day there was over 30 ounces output. The non-protein nitrogen rose to 55 on March 4, the second day after the third dose of salyrgan, when the output went down after having been 31 to 34 previously. His penis and scrotum had become very necrotic, necessitating a dorsal slit and constant drainage. In spite of this his course was downhill and he died on March 9, seven days after he received the third dose of salyrgan.

DR. F. DENNETTE ADAMS: To me the most interesting point is whether or not we did get a type of salyrgan effect not anticipated or desired. It sounds much worse than it really was, for the man was in very bad shape anyway. I have never felt quite so guilty about the situation as Dr. Chapman seems to feel, because undoubtedly the urinary secretion might well have been due to shut-down anyway. The patient was very sick before administration of the drug. The condition of the scrotum and penis was such that it certainly would have been remarkable had he lived. With the sudden shut-down of the kidneys within a few hours after three injections we have to consider the possibility of a nephritis which would in part account for the end result. I should not however be surprised to find that he had postmortem a positive blood culture with septicemia, not nephritis, as the terminal cause of death.

DR. CHAPMAN: We thought at the time because his genitalia were so inflamed and red that he might have a hemolytic streptococcus infection. The culture however showed staph-

*Recently senior interne on the West Medical service.

ylococcus aureus. No renal function studies were attempted. The specific gravity had varied between 1.010 and 1.030.

CLINICAL DIAGNOSES (FROM HOSPITAL RECORD)

Hypertensive heart disease.
Congestive failure.

ANATOMIC DIAGNOSES

Hypertensive heart disease.
Arteriolar and glomerular degeneration of the kidneys.
Infarct of the kidney.
Chronic passive congestion, general.
Coronary sclerosis.
Septicemia, staphylococcus aureus and streptococcus hemolyticus.

PATHOLOGIC DISCUSSION

DR. TRACY B. MALLORY: At autopsy we found the usual signs of hypertensive heart disease. There was an enormous heart, weighing 800 grams. The kidneys were slightly atrophic, only slightly granular. Microscopically in most areas there was a moderate degree of arteriolar and to some extent of glomerular degeneration. I think we have found an explanation for the sudden change in the renal picture. It was not a salyrgan nephritis. His last dose, you see, was seven or nine days before autopsy. I am quite sure that if he had had at that time a definite tubular involvement from mercurial poisoning we should certainly have found evidence of it at the time of autopsy. There was none. We did however find an extremely large infarct in one kidney measuring 4 centimeters in length and 3 centimeters in diameter. Half of one kidney was involved. That would certainly explain the findings in the urine, the cells, casts, etc. I think it might, in a patient as sick as this man was, explain the relative anuria. I do not know whether or not it was a reflex anuria. He probably had kidneys that were already functioning not too well from congestive failure. I think that under those circumstances infarction of a large area of renal tissue might well produce definite symptoms of renal insufficiency. Apparently it did here.

The only other finding was a very marked degree of coronary sclerosis. There was no infarction of the heart.

DR. ADAMS: Were the blood cultures positive?

DR. MALLORY: Yes, for both staphylococcus aureus and hemolytic streptococcus.

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THE WHITE HOUSE CONFERENCE

THE medical and allied professions of Boston figured prominently in the recent White House Conference on Child Health and Protection, and we may be justly proud of the services which these, our representatives, rendered. Four sections, on Medical Service, Public Health Service and Administration, Education and Training, and The Handicapped; Prevention; Maintenance; Protection, with their general committees, comprised the conference. All except the section on Medical Service held their conference in Washington in November, 1930; that section required more time for its arduous labors and held its conference in April of this year.

In the section on Medical Service, Kenneth D. Blackfan and Harold C. Stuart were chairman and vice-chairman respectively of the Committee on Growth and Development; Robert L. DeNormandie headed a sub-committee of the Committee on Prenatal and Maternal Care, as did Bronson Crothers, Robert B. Osgood, Percy R. Howe, Stella Goostray and Ida M. Cannon in the Committee on Medical Care for Children. George H. Bigelow was chairman of the Committee on Communicable Disease Control of Section II, on Public Health Service and Administration, and numerous others served in less conspicuous rôles. In the final conference in April we find Walter B. Cannon presiding at a session of the Committee on Growth and Development, and contributions made by such men as Edwin B. Wilson, professor of vital statistics at the Harvard School of Public Health, Fritz B. Talbot and Douglas A. Thom.

Some of the deliberations of this committee will give us an idea of the problems of the conference and its methods of attack. This attempt at the collection and evaluation of definite knowledge met face to face one insurmountable fact. In the words of Dr. Wilson "... one thing that those of us who have been engaged upon the work of this conference have learned, and learned not a little to our surprise and regret, is the noncritical, nondefinitive nature of so much of the material with which we have had to deal". And again, "It has been an unfortunate characteristic of much of the work in the prediction and control of human behavior that the desire to solve problems runs far ahead of the attempts to develop sound methods for their solution." Despite our advances in knowledge, sound knowledge was often found lacking.

Another viewpoint and another fault in our handling of the problems of childhood was later expressed by Dr. A. J. Carlson, professor of physiology at the University of Chicago, when he said that no informed man or woman could study the various committee reports without reaching the conclusion that despite the very serious gaps in our knowledge, we know today a great deal more than we actually apply in child welfare.

Other enlightening, sometimes rather chastening information was brought out in the reports of this committee. Despite the great reduction in infant mortality "there has not been the corresponding decrease in childhood morbidity that we could have wished". "Information on the effects of tuberculosis on normal development is conspicuously defective." "In the so-called 'health examination' the physician who is equipped to appraise only the physical aspects of the child will be doomed to failure. The physician who is to be successful in conducting periodic appraisals ... will be the one who learns to recognize and deal with problems of training and behavior as well as those of weight and height and physical defects, who is familiar with the various stages of mental development, who has learned to judge when expert psychiatric or physiological advice is needed, and who appreciates the influence of the social and economic environment upon both physical and mental development."

A summarization of the findings and recommendations of such a report requires, obviously, something little short of genius. In Dr. Blackfan's summary we find no dodging of issues.

The outstanding fruitful accomplishment of the Committee on Growth and Development, according to Dr. Blackfan, has been the coöperation between authorities from the research laboratories and physicians whose activities lie in the clinic and at the bedside. Growing is the appreciation that in dividing the study of the child among various specialties, we have been in danger of losing sight of the child himself. One principle of scientific advance which must be clearly understood by scientists and laymen alike is that scientific knowledge is never final. We advance by a series of trials and approximations, each time coming closer to the ultimate truth but never completely attaining it. To advance our knowledge of normal growth and development, the line of attack which at present seems most fruitful is the careful and extensive study of a relatively small number of individuals, carried over a long period of time.

The conference has been a vast stock-taking of our existing knowledge of child health and welfare. Many gaps in that knowledge have been found; many failures to avail ourselves fully of what we do know. As an enlightening appraisal it has served a useful function; its value will be more fully realized if we can now, using it as a point of departure, organize our forces for a more intelligent attack on the problems which confront us.

THE DATE OF THE ANNUAL MEETING OF THE MASSACHUSETTS MEDICAL SOCIETY

COMMENT has been made by members of the Society with respect to the conflicting date of the annual meeting of the American Medical Association and that of the Massachusetts Medical Society this year.

Members of our Society were made aware of criticisms during the meeting of the A. M. A. with the question as to whether Massachusetts had seceded from the American Medical Association or is in competition with that body.

The fact is that the time of the Annual Meeting of our State Society for 1931 was fixed at the Council Meeting in June, 1930, whereas the date of the meeting of the A. M. A. was not announced until some months later. It will thus be apparent that the Massachusetts Medical Society had no intention of competing with the American Medical Association.

It is difficult to find non-conflicting dates for the great number of important meetings in June of each year. The suggestion has been made that the date of our meeting might be changed to the Autumn, but that is not according to precedent for the by-laws state in Chapter II, Section 1 "The Annual Meetings of the Society shall be held in Boston on the second Wednesday of June unless otherwise ordered by the Council."

Since no action was taken at the last Council meeting the provisions of this by-law stand unless at a subsequent meeting it is deemed best to change the date. There is little likelihood of having the next meeting outside of Boston since no invitation from any other locality has been tendered.

Unless action is taken to change the time and place, the *Journal* will publish the statement that the 1932 Annual Meeting will be held June 8 in Boston.

We hope that the American Medical Association will extend the courtesy to the Massachusetts Medical Society of selecting a date which will not conflict. We should not have to lose the presence of those who are obliged to attend the meetings of the American Medical Association.

NOTE—The stenographer's report of the remarks at the Annual Dinner June 10, 1931, has not been edited by the speakers, but will appear in the columns of the *Journal* as soon as it has been approved.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

WATTS, JAMES W. B.S., M.D. University of Virginia, Dept. of Medicine, 1928. House Officer in Neurology and Neurosurgery, Massachusetts General Hospital 1928-1929. Interne, Long Island College Hospital, Brooklyn 1929-1930. Now, Assistant and Assistant Resident in Surgery at University Clinics, University of Chicago. Address: 950 E. 59th Street, Chicago, Illinois. Associated with him is:

MIXTER, WILLIAM JASON. B.S., M.D. Harvard University Medical School 1906. F.A.C.S. Chief of Neurosurgical Service, Massachusetts General Hospital. Neurological Surgeon, Beth Israel Hospital. Consulting Surgeon, Anna Jacques Hospital, Cape Cod Hospital and Amesbury Hospital. Assistant in Surgery, Courses for Graduates, Harvard. Address: 319 Longwood Avenue, Boston. Their subject is: "Spinal Epidural Granuloma." Page 1335.

RICHARDS, LYMAN G. A.B., M.D. Harvard University Medical School 1919. F.A.C.S. Surgeon in Otolaryngology, Children's Hospital. Associate in Otolaryngology at the New England Baptist Hospital and New England Deaconess Hospital. Consultant in Otolaryngology at the Peter Bent Brigham Hospital. His subject is: "Forgotten Foreign Bodies." Page 1344. Address: 319 Longwood Avenue, Boston.

PALMER, ROBERT STERLING. A.B., M.D. Harvard University Medical School 1925. Assistant in Medicine, Massachusetts General Hospital and the Harvard Medical School. His subject is: "Referred Pain of Gastro-Intestinal Origin Simulating Angina Pectoris." Page 1351. Address: 264 Beacon Street, Boston.

RANKIN, FRED W. B.A., M.A., M.D. University of Maryland School of Medicine 1909. F.A.C.S. Head of Section of Surgery, The Mayo Clinic, Rochester, Minn. Associate Professor of Surgery, Mayo Foundation, Rochester, Minn. Lieutenant Colonel in the Medical Reserve Corps of the United States Army. His subject is: "Malignant Lesions of the Large Bowel." Page 1353. Address: The Mayo Clinic, Rochester, Minn.

FERGUSON, JOHN A. M.Sc., M.D. University of Western Ontario Medical School, London 1925. Instructor in Pathology, Harvard Medical School. Assistant Pathologist at the New England Deaconess Hospital. His subject is: "An Unusual Case of Epidermoid Carcinoma of Uterus and Fallopian Tubes." Page 1359. Address: 240 Longwood Avenue, Boston.

TRUESDALE, PHILEMON E. M.D. Harvard University Medical School 1898. F.A.C.S. Surgeon-in-Chief, Truesdale Hospital, Fall River. His subject is: Diaphragmatic Hernia in An Adult." Page 1362. Address: 151 Rock Street, Fall River, Mass.

REED, ALFRED C. M.D. University and Bellevue Hospital Medical College 1910. Professor of Tropical Medicine, University of California. His subject is: "Granuloma Inguinale. Case Report." Page 1364. Address: University of California, Parnassus and Second Avenues, San Francisco, Calif.

GREENBERG, BORIS E. M.D. Tufts College Medical School 1918. Assistant Urologist, Beth Israel Hospital. Urologist, Evangeline Booth Hospital. Consultant Urologist, Essex County Tuberculosis Sanatorium. His subject is: "Oil as a Cystoscopic Medium." Page 1366. Address: 636 Beacon Street, Boston.

COUES, WILLIAM PEARCE. M.D. Harvard University Medical School 1894. F.A.C.S. Surgeon to Out-Patients, Massachusetts General Hospital. Consulting Surgeon, Massachusetts Eye and Ear Infirmary. Instructor in Surgery, Tufts College Medical School. His subject is: "Edward Wyer's 'Observations on the Lymphatic Distention of the Lower Extremities of Women While in the Puerperal State'." Page 1368. Address: 12 Monmouth Court, Brookline, Mass.

OSGOOD, ROBERT BAYLEY. A.B., M.D. Harvard University Medical School 1899. F.A.C.S. John B. and Buckminster Brown Professor of Orthopaedic Surgery, Harvard Medical School. Consulting Surgeon, Boston Children's Hospital. His subject is: "Hazards and Hopes In the Education of Trained Nurses." Page 1369. Address: 372 Marlborough Street, Boston.

MISCELLANY

A BROADCASTING MESSAGE PREPARED AND SPONSORED BY THE COMMITTEE ON PUBLIC EDUCATION OF THE MASSACHUSETTS MEDICAL SOCIETY FOR THE DEPARTMENT OF PUBLIC HEALTH

WHAT THE PUBLIC SHOULD KNOW OF FRACTURES*

Every fracture is serious, many desperately serious.

Every fracture is a break in a bone. Bones are important—they are the levers with which we work in the world.

A broken lever in the human body *cannot be replaced:—it must be spliced or welded.* It can never be improved by the breaking, and very often, with the best sort of splice, is *not* so good as new.

Today, with the automobile as chief cause, the very serious fractures are increasing greatly in number, and in gravity.

There is a widespread feeling that professional skill should mend them *all. It can't be done!*

Modern surgery can do a great deal, but there are limbs that are wrecked beyond repair, others in which only a more or less damaged limb can result, with all possible care, with all skill.

This should be understood!

Also, understand that the trend of the best professional effort is not toward the impossible problem of putting things back *exactly as they were before,* but towards making a limb *just as useful as before.*

It is much more important to have full use, than to have a perfect x-ray result. Often, one cannot have both!

In a fracture of the leg, it is of first importance that the weight-bearing line be right; much more important this, and that knee and ankle be supple, than that we should fuss over overcoming even a slight displacement, or a bit of shortening. In fact, practically, nothing is of less importance than a slight shortening in a leg fracture. In children it is of no consequence at all, as it is swiftly equalized in growth. In adults it is not equalized in growth, but by adjustment.

Most of you do not believe this, but it is so, and you pay for your disbelief, in the end, in the pain and risk of operation, often forced on the surgeon, in the long-continued stiffness of limbs,—sometimes permanent.

Do not understand me to condemn open operations, in fracture cases,—often the only logical measure, BUT, to be done for surgeon's reasons, not with a view to x-ray results!

Next, understand that *more apparatus, more intensive bed confinement, more convalescent care* mean efficiency, not fussiness.

You should also know that there is always a chance in grave fractures, of a delay in union, or non-union, due, commonly, to imperfect repair chemistry in the patient's own body.

This may lead to long delay, perhaps to later operations,—often bone grafting operations.

*WBZA radio broadcast June 3, 1931 at 5.20 P. M.

This is, usually, no one's fault—just the "luck of the game".

So, too, if a fracture is "compound", that is, if the skin is broken from without, or by thrusting through of the broken bone, there is always the chance of infection, calamitous if it does happen,—relievable in a measure by modern methods. Likewise, infected compound fractures do give poor average results, and with best care, never a certainty of avoiding infection.

What should you know about *diagnosis* of fractures?

Very little!

Now, as to what one, not a medical man, should be ready to do, in case of fracture or suspected fracture—

Nothing too much, or too hurriedly!

In case of the simpler fractures,—a broken wrist, a smashed shoulder,—it is, first, a problem of a bit of rest from the shaken nerves, and then of rest and support for the injured limb. If the foot is all twisted to one side, or the arm contorted, one may safely *pull* on foot, or ankle, or wrist, to reduce the evident deformity, and then contrive to *support the limb*. In collarbone, shoulder, or arm fractures a sling suffices for present needs.

In fractures below the knee, with loose fragments: *pull* into place!—support by packing clothing on either side of the limb, and, if the fracture is compound, and bleeding seriously,—put pressure on the wound, with a clean handkerchief; *press with the hand, no tourniquet!*

And, beyond that, in leg fractures, hip fractures, fractures of the pelvis, suspect fractures of the spine, body injuries,—in all these, if an ambulance or a doctor can be secured, even with a little delay,—do nothing! Wait!

The ambulance crew is trained to its job, and a good deal of harm can be done in handling a seriously injured man. If an ambulance is not available, we must use a car. Support the man, *and the broken limb, very gently*, place the patient crosswise on a rear seat, and proceed.

There is a further question—*what hospital, what doctor!*

Not always easy to answer!

The *best* hospital, unless it is too far, and remember that ambulance transportation, even for several miles, takes very little out of the injured man.

Hurried rushing of the injured, in ambulance or car, to the nearest hospital, or to the nearest doctor, may be unwise,—only too often neither hospital nor doctor is equipped for the job.

As to the doctor.

There is no reason in the world why the family doctor should not treat fractures,—despite a lot of talk to the contrary.

If the case is too serious, he will suggest a consultation.

If you are uneasy, *ask him to have a consultation. If he refuses, then he is not the right man.*

Nor is it necessary to demand that the specialist "take the case".

Sometimes, yes!

In most cases of broken bones, the specialist can pass on the broad issues, after seeing patient and x-rays, and from then on, your doctor is your man.

The *busy* fracture specialist is not greatly concerned about the opportunity of gathering in routine cases. *His* business is in taking care of the cases the other fellow doesn't care to shoulder!

Four times in five, your doctor is the man for the job.

The specialist is, or should be, the "back stop" only,—save for the operative cases, or those requiring the care, the material paraphernalia, the teamwork, that mean concentrated institutional facilities.

If you only knew how hard we are working to try and get the best fracture care!

The American College of Surgeons has a "Fracture Committee", a couple of dozen of the experienced men of the whole country.

Last month we met in New York for two days, twenty strong, from many States, bent on devising, as we have been for years,—better methods, better personnel, better hospital facilities, better education, within and without the profession,—in order to secure a progressive lessening of the toll that fractured bones take of our national efficiency and happiness.

If you knew more of this, we would fare better.

In all of this work, *we* are so dependent upon *you*.

Not only must you trust us as to matters of which you cannot, in the nature of things, know a great deal, but *you must help us to get you well!*

You cannot go to the doctor and say,—"Fix this, I pay you."

He is ready to do his part;—do you yours!

Half the incapacity resulting from fractures is due to the utter lack of coöperation on the part of the patient.

Centuries ago, Ambroise Paré wrote, "I dressed him, God healed his wound."

After the healing of the wound, comes convalescence.

Convalescence is unpleasant always!

Effort unpleasant, but necessary!

Among the things that "the public should know about fractures" is that convalescence, even under modern methods of early massage and active motion, demands something of the patient;—often much.

We are getting fracture cases into action weeks earlier than we did twenty years ago,—but, that helps little unless that patient will act.

So many lie down and complain, or learn to like hospital life. We have no police power. Too bad!

There is an Austrian surgeon, Dr. Lorenz Böhler, whom we all envy. He does what he thinks is right. He is vastly skilled. After that, patients do as they are told. He gets results, splendidly.

And, now, to remember:—

Uninstructed (or instructed) "first aid" may be perilous.

WAIT, and get an ambulance.

Get the best doctor, or the best hospital, within range.

Do as he says.

If he wants a consultant, say "Yes."

Recognize that he can only do the best that *can* be done.

Expect no miracles.

It's *your leg* and *YOU* have got to do something to get it back to work.

THE X-RAY WILL DEMONSTRATE THE PRESENCE OF LEAD IN CHILDREN

According to reports of a paper read at the recent meeting of the American Medical Association Dr. Edward C. Vogt of Boston showed that lead poisoning in children would be demonstrated by the x-ray shadow of the growing margins of bones.

Lead is too often ingested by children as a result of chewing or sucking painted toys or furniture.

It is recommended that children be prevented from taking into the mouth any painted thing and if there is reason to suspect lead poisoning that x-ray pictures be taken of the bones.

THE MEMORIAL HOSPITALS' DRIVE HAS ATTAINED THE OBJECTIVE

In its appeal for $100,000 the Massachusetts Memorial Hospitals only asked for the actual amount needed to enable prosecution of the work under way. So far as programs for the raising of money for hospitals are concerned, this was a modest demand and its early success at a time when so many urgent appeals are under way demonstrates a cordial and sympathetic spirit among those to whom the appeal was made.

In all probability more money will be needed from time to time and the precedent now established is evidence of success in future appeals.

THE MOSQUITO NUISANCE

The mosquito is with us now. Some species propagate in dirty or contaminated water and may add infection to the irritating bite. Much can be done to eliminate or at least diminish the annoyance of these pests.

In order to bring about the reduction of the mosquito nuisance, many towns have adopted the standard mosquito ordinance, which makes it a misdemeanor for any property owner or tenant to allow mosquitoes to breed on his premises. Copies of this ordinance may be obtained from your State health department or from the Public Health Service at Washington, D. C.

CORRESPONDENCE

ANOTHER SWINDLER

June 20, 1931.

Editor of *New England Journal of Medicine,*
165 Newbury Street,
Boston, Massachusetts.

Dear Doctor:

I am taking the liberty of writing these few lines feeling it is my duty to prevent other physicians from being swindled as I was.

A "supposed to be" salesman of F. A. Davis Company, publishers of Philadelphia, came to me on May 20, 1931, and got me interested in buying certain books both from the above mentioned publishers and from a doctor's widow who was selling out her library. He showed me all his credentials as well as a big sample of medical literature in his case and pleaded with me to pay him $15 on account which I foolishly did. He promised to send those books in a short while. Having waited all this time and not having received the books I have investigated and found this man a swindler, and I felt it was my duty to get in touch with you so as to call the attention of the members of the medical profession to be on the lookout for this man.

His name is Henry J. Landry, a man of short stature, fair and about the age of 45.

I am inclosing a copy of the information received from F. A. Davis Co. of Philadelphia.

Is there any suggestion you would offer as to how to proceed in this case to bring this man before justice?

Yours very truly,

JOSEPH A. DUBINS.

COPY OF LETTER FROM F. A. DAVIS CO.

June 19, 1931.

Dr. J. A. Dubins,
371 Commonwealth Avenue,
Boston, Massachusetts.

Dear Doctor:

Mr. H. J. Landry has not been in our employ for several months and his present whereabouts is unknown to us and his wife and friends in Worcester.

We understand that Mrs. Landry is at 15 Piedmont Street, Worcester, but she has not heard from Mr. Landry for some time.

Will you kindly send us the receipt or duplicate of any order which you may have given Mr. Landry.

We shall be pleased, of course, to render every assistance in making a satisfactory adjustment providing you will send us your receipt or any other evidence of any money which you may have paid to Mr. Landry. It will be necessary for us to produce this evidence in our final adjustment with Mr. Landry.

Should you learn of Mr. Landry's whereabouts, will you kindly telegraph us immediately at our expense. Please let us hear from you in the enclosed reply envelope giving us as much information as possible and enclosing the receipt given you

by Mr. Landry which will, of course, be returned to you promptly should you desire it.

Yours very truly,

F. A. DAVIS COMPANY.

A PERMANENT CANCER COMMISSION IN CALIFORNIA

California Medical Association
Four Fifty Sutter
San Francisco

June 9, 1931.

Managing Editor, *New England Journal of Medicine:*

At its recent annual meeting the California Medical Association authorized the creation of a permanent Cancer Commission to represent the Association in all phases of the organized fight upon the increasing menace of this disease.

As its first objective, the Commission plans to review and bring widely to the attention of the profession in California the most modern methods of diagnosis and treatment of cancer, and especially of early cancer, since it is obvious that increasing numbers of patients with early cancer are seeking advice.

Later efforts will be directed toward education of the lay public on the signs and symptoms suggestive of early cancer. The establishment of specially equipped clinics and hospitals will be encouraged as well as more extensive clinical and laboratory research.

It is a source of gratification to be able to inform you that the Commission has already been appointed and that its plans of organization are well under way.

The present members of the Commission, as appointed by the President of the California Medical Association, are:—

Dr. Charles A. Dukes, Oakland, Chairman; Dr. Lyell C. Kinney, San Diego, Vice-chairman; Dr. Alson R. Kilgore, San Francisco, Secretary; Dr. Harold Brunn, San Francisco; Dr. Orville Meland, Los Angeles; Dr. William Ophuls, San Francisco; Dr. C. G. Toland, Los Angeles; Dr. H. J. Ullmann, Santa Barbara; Dr. A. H. Zeiler, Los Angeles; Dr. Junius B. Harris, Sacramento, President of California Medical Association, Ex officio.

Very sincerely yours,

A. R. KILGORE, M.D.

NEWS ITEM

THE APPOINTMENT OF DR. J. M. LOONEY AT THE WORCESTER STATE HOSPITAL—Dr. Joseph M. Looney, A.B., M.D., Professor of Biochemistry at the Jefferson Medical College, Philadelphia, and formerly Director of Laboratories of the Sheppard and Enoch Pratt Hospital, has been appointed Chief of Laboratories of The Memorial Foundation for Neuro-Endocrine Research of Boston. He will be on duty at the Worcester State Hospital.

NOTICES

ANOTHER DOCTOR CONVICTED OF CONSPIRING TO DEFRAUD INSURANCE COMPANIES

Dr. Joseph St. Angelow of Boston has been sentenced to six months in prison for conspiracy to defraud insurance companies.

Attend to narcotic registration before July 1, for delinquents will be subject to penalty.

SOCIETY MEETINGS

CONGRESSES AND CONFERENCES

July 26-31—Third Congress of the Pan American Medical Association. See page 632, issue of March 19.

July 27—The Post Graduate Course of Ear, Nose and Throat Surgery at the University of Bordeaux, France. See page 951, issue of April 30.

July 27-31—Third International Congress of Radiology, Paris. See page 789, issue of April 9.

August 3-8—The International Congress of Industrial Accidents and Diseases. See page 1330, issue of June 18.

Aug. 31 - Sept. 4—Neurologists will meet in Berne, Switzerland. See page 896, issue of April 23.

September 14-17—The American Public Health Association. See page 632, issue of March 19.

October 12-16—An Announcement of the Clinical Congress of the American College of Surgeons. See page 1175, issue of May 28.

October 19-22—The Interstate Post Graduate Medical Association of North America. See page 1125, issue of May 21.

October 19-30—Graduate Fortnight of the New York Academy of Medicine. See page 1230, issue of June 4.

April 4-8, 1932—The American College of Physicians. See notice on page 1232, issue of June 4.

DISTRICT MEDICAL SOCIETIES

Bristol North District Medical Society

September 17—Details to be announced.

Plymouth District Medical Society

July 17—Midsummer meeting. See page 1011, issue of May 7.

BOOK REVIEW

The International Medical Annual 1931. 49th Year. Edited by CAREY F. COOMBS and A. RENDLE SHORT. William Wood & Company, New York. Pp. 551. Price $6.00.

The medical annual has the professed function of furnishing "a digest of the world's medical literature, critically considered and reduced to a small bulk by competent authorities". The particular series of which the present volume is the latest issue is outstanding among this class of publications, and is, in the opinion of the reviewer, the best of the medical annuals. The editors have hit upon the happy arrangement of including in practical detail the important advances in many fields of activity, as well as mentioning with adequate references related articles which justify only casual consideration. The synopses are made still more valuable by frequent comments from the contributing staff—each a specialist in the field assigned for review. Moreover, the introduction is devoted to calling attention to the outstanding advances of the year.

The book can be unqualifyingly recommended not only for the wealth of practical detail which it contains, but also because of its profuse references to recent publications.